October 1983
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Emphasis On Education

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In-Depth Evaluations:
- **Apple Lisa**
- **TRS-80 Model 4**
- **TRS-80 MC-10**
- **Olympia Compact Printer**
- **22 Educational Packages**
- **HiPlot DMP-29 Plotter**
- **Centurion Computers**
- **Dow Jones Reporter**
- **Power Pad**
- **Businesspak+**
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- **Apple Writer II**
- **CompTrol Lab**
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9,250 Apples For The Teacher

Profile Of The Creative Individual

Communication For The Handicapped

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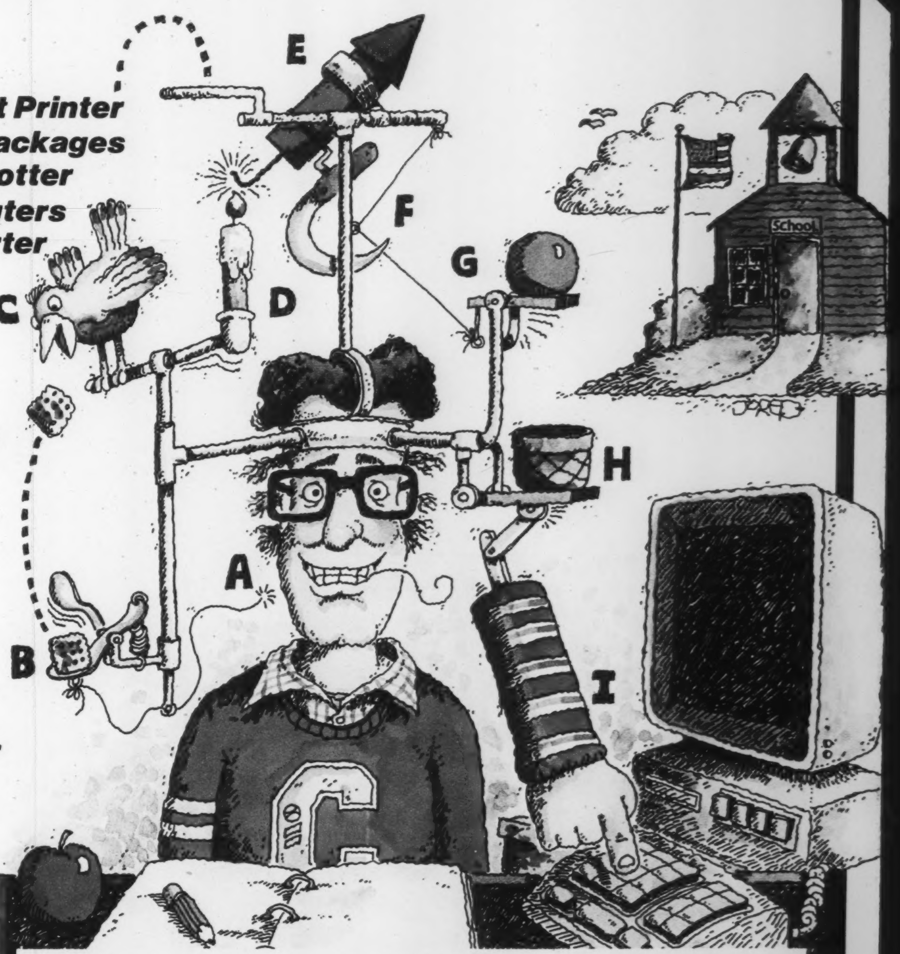

How to turn on your computer (with apologies to Rube Goldberg). As you bite the string in your mouth (A) it sets off the spring-loaded spoon (B) which releases the cracker. The bird jumps off his perch to catch the cracker (C) and lands on the lower perch which raises the candle (D) setting off thesky-rocket (E), which in turn, causes the sickle to cut the string (F) and allows the orange to fall (G) landing in the basket (H) which pushes the arm bracket down (I) turning the computer on. If crackers are not allowed in the classroom, a nightcrawler will do fine.

WHILE OTHER COMPUTER COMPANIES ARE BUSY SETTING NEW PRICES,
SPECTRAVIDEO IS BUSY SETTING NEW STANDARDS.

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MSX™ and LOGO™: Two
Spectravideo is
in Personal

While price wars and confusion reign all around us, Spectravideo goes about its business, setting standards by which all other personal computers will soon be judged. MSX and LOGO are the two latest examples of how Spectravideo is rocking–and reshaping –the personal computer industry.

MSX AND LOGO.

It is now history that, on June 15 1983, Spectravideo, Inc. joined with most of Japan's largest electronics firms to launch MSX: The most far-reaching personal computer standard in history. MSX is the name given to a specific hardware/software configuration that makes product interchangeability possible. While Spectravideo is proud to participate in MSX, we are even prouder of this fact: It was our own SV-318 computer that was used as a prototype for the MSX design! There are two important aspects to this.

First, all future MSX hardware–i.e. computers, peripherals, appliances–will be based on several key design elements of the SV-318. What does this mean to you, the consumer? A great deal, because when you buy an SV-318, you will not only be able to use all of Spectravideo's own software and hardware–you'll also be able to take advantage of all the remarkable new equipment that will be coming from other MSX participants.

In addition, the software aspect of MSX was largely inspired by the software built into the SV-318. From the outset, Spectravideo offered built-in Microsoft BASIC as its resident interpreter. Now, Microsoft

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also makes a LOGO program compatible with the SV-318. It was Spectravideo's Microsoft BASIC/LOGO that helped to make MSX possible.

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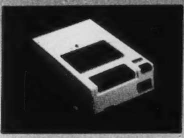
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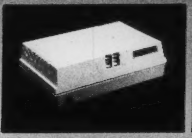
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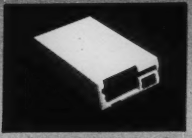
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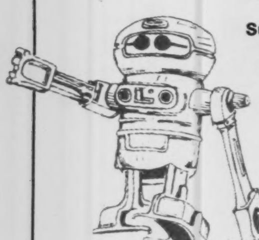

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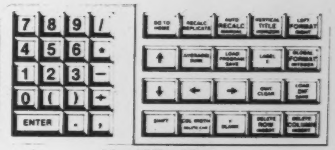

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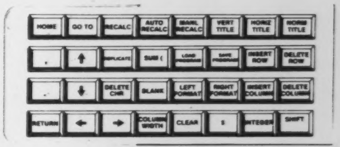

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CIRCLE 144 ON READER SERVICE CARD

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When Kids Are Ready

Dear Editor:

I was pleased to see an article on psychology ("My Five-Year Old Knows Basic") in the April 1983 issue of *Creative Computing*." However, I disagree with the major point of the article which was that children younger than 13 years old should not be taught how to program. This conclusion was based on the theory of the Swiss psychologist Jean Piaget. Although many of the experimental findings of Piaget are important, I think it is fair to say that *every* prediction of his theory concerning what children cannot learn that has been adequately tested has been disconfirmed. I am not advocating that everyone be forced to learn how to program at an early age. However, there is no reason that a child who is interested in computers should not be given the opportunity to learn how to program.

David M. Lane
Department of Psychology
Rice University
P.O. Box 1892
Houston, TX 77251

Glib Lib

Dear Editor:

I feel compelled to comment on Peter Favaro's article entitled, "My Five Year Old Knows Basic," (*Creative Computing*, April 1983). Mr. Favaro undertakes the task of presenting a theoretical framework to help parents and teachers make decisions about what and when children should learn about computers. While well-intentioned, Mr. Favaro's article can be added to a long list of educational wisdom literature; the literature in which we "apply theory to practice."

Applying developmental, cognitive or other psychological perspectives to teaching children is a very complex task, one filled with qualifications and exceptions. Unfortunately, most of what parents and teachers encounter is the brief (often glib) exposition. These expositions leave most thoughtful parents and teachers wondering why *they* can't seem to apply these theories. The reason is, theory is rarely explained well in these expositions which are then too quick to prescribe what *should* be done.

Mr. Favaro says "readiness implies that a child will learn a concept, behavior, or skill, only when he is developmentally prepared and not before." Why not just say—a child is ready when he is ready. Mr. Favaro points out that children, for all intents and purposes, can be quite identical and yet not be able to do identical things. In these cases, we can (according to Mr. Favaro) plausibly conclude that the children are developmentally different. But how does that help us? How does the word "developmentally" add anything more than simply asserting that children are just different? Is it meant to suggest we must teach only things that children are already doing? More to the point, does "developmentally" help us better understand these differences?

Mr. Favaro sets up "developmental categories" based upon Piagetian theory. For each category he suggests specific ways to use the computer with children. The format of a letter to the editor precludes a point by point critique of these suggestions. It is, however, interesting to note that while stages are described in lightning-like fashion the only guidance we are given is age ranges for the various stages. Preoperational children are found from 2 to 7; concrete operational from 7 to 11, etc. What happened to those two chronologically and experientially "identical" children who were so "developmentally" different?

Piaget, while the pre-eminent cognitive developmentalist, is not the last word on many questions about thinking and learning. Piaget's tasks represent only a sample of children's cognitive abilities. Using age spans and stage labels to pigeonhole children and select appropriate learning for them is not a useful aspect of a theoretical framework for parents and teachers.

A more careful application of Piagetian theory to education leads one to conclude that developmental readiness must be assessed in terms of particular children and particular learning. To be learned effectively, material cannot be so novel that children lack concepts to which the new material can be related. If we succeed in making material meaningful to children they will learn. Piaget helps us understand the progression of operations a child uses to construct knowledge. Understanding this progression can help us design appropriate instructional strategies to give children appropriate experiences and data. Determining what children *can* learn about computers requires thinking about what we want them to know, what they presently know, and how (or if) we can help them meaningfully relate these two.

This entire discussion begs the question of what children *should* learn about computers. An answer here will depend on analyses of our values, of what knowledge is bound up in this area we call "computers," and what (if anything) we must give up to make room for computers on our agenda for children. I only hope we avoid Mr. Favaro's suggestions that computers become electric crib toys for sensorimotor children, drill and practice aids for the preoperational, a calculator for concrete operations, and only finally a computer. Instead, perhaps we will be able to explore the computer as a tool or environment for sharpening thinking and problem solving skills.

Alan N. Rudnitsky
Associate Professor
Education and Child Study
Smith College
Northampton, MA 01063

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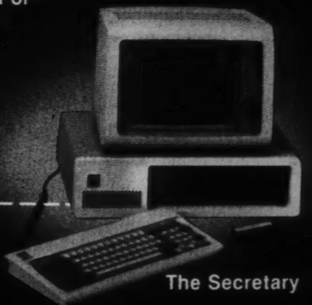

The Secretary

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* ELAN (Extended Local Area Network) formerly ComNet

TECMAR 6225 Cochran Road, Cleveland, Ohio 44139, Phone (216) 349-0600, Telex 466692

CIRCLE 253 ON READER SERVICE CARD

Sort Retort

Dear Editor:

I read with interest Howard Kaplon's article "A Comparison of Sorts, Revisited" in the May 1983 issue. The discussion is incomplete since speed of execution and list size are the only variables discussed. One is left with the impression that bubble type sorts are useless except on small lists or as modules in other algorithms.

This is true if all you ever intend to sort is lists of random numbers. If however, multikeyed records are sorted on a primary key and many records which have the same primary key are ordered on a secondary key bubble sort is stable. Algorithms such as quicksort, shell, and heap sort which make exchanges between nonadjacent elements will destroy this secondary ordering. Therefore if sort stability is important these sorts should not be used.

Speed and stability can be bought with space. The two-way merge sort, which is of order N 1n(N), preserves secondary ordering, but requires an additional scratch array. This algorithm treats a file as N files of length 1. Adjacent files are merged into N/2 files of length 2. This process continues back and forth between the original space and scratch space until there is one file of length N.

In conclusion; speed and size are not the only important issues in comparing sorting algorithms. Stability and memory may also be important depending on the application.

Ellis Workman
120 NW 37th Ave.
Rochester, MN 55901

Eyes Have It

Dear Editor:

I was quite pleased with the review of the Eye security / home control system done by Otto Moyen-van Slimming in your August issue. However, I would like to point out some product improvements that have been instituted since the review unit was purchased.

First The Eye may now be placed in any free Apple slot (except zero). Also, the BSR controller "beep" is an intentional feature; it is helpful to transmit the code several times to insure that "line noise" does not cause erratic operation of the BSR system.

Another very useful BSR feature is the addition of a second on-off cycle for the BSR scheduler. The timer may be activated using either or both of the schedules, and may be programmed by day-of-week to automatically select the proper schedule(s) on the proper day.

As a final note, the capacitance value for the RC filter should be in the range of .1 mfd to 1 mfd, instead of the misprinted .01 mfd spec in the manual. This has been corrected.

I hope that these clarifications will aid your readers. Thank you for a well done, thorough review of our product.

Joseph R. Fuller
President
Lehigh Valley Computer Corp.
Corporate Headquarters
523 South Clewell St.
Bethlehem, PA 18015

Saving Interface

Dear Editor:

The article by Nancy Blumenstalk Mingus ("A Letter Quality Alternative for Atari Users") in the June issue of *Creative Computing* was very accurate. But one important fact was missing.

She does not mention the use of the MEM.SAV file with the Atari 850 interface. The disk you are working with *must* have a MEM.SAV file on it or you will lose the handler if you call up DOS. The interface boots just the same as the disk drive. The interface handler is put into the same memory location that is used by DOS. The MEM.SAV file is needed to save the handler and replace it when the DOS is finished.

I found this out the hard way about four months ago when trying to connect a TI Silent 700 series printer to my Atari 800. The TI 700 series RS-232C has a line Data Carrier Detect which *must* be tied to +12 volts or the printer will not see the data coming from the interface module.

I hope this information will save some of your readers the grief I went through to uncover this.

Ray Holich
1601 Willow Lane
Mount Prospect, IL 60056

Stop the World

Dear Editor:

Several readers have pointed out errors in the World Builder program (June 1983), and one question has been asked several times. I'm writing to answer the question and to advise others of the corrections in the program.

Many readers have asked about the square bracket in a mathematical expression. Some Radio Shack printers print this instead of a carat or an up arrow. This is the arithmetic exponentiation sign. Thus 2[3=8.

In line 520 the formula should be P = (1.25 - L[.285714) / MS /.005

The original expression can give negative percents of stellar life for certain stars.

In line 590 the formula should be L = EXP(4.4228 - .9195 * M)
The original formula was in error because I changed from base 10 to base e. The resulting errors weren't obvious since they were still the right order of magnitude.

I have been persuaded to change the lower temperature limit for human habitability. In line 2060 the expression LL<-30 requires a lowest low temperature of -30 degrees F. The coldest continuously inhabited spot on Earth gets down to -60 degrees. I couldn't live there but somebody does. Thus the expression in line 2060 should be LL<-60.

I am very pleased by the amount of comment this program has generated. I've just completed work on an improved version. It contains some 89 stars, built-in data tables on the Solar System and more extensive alien life form and psychology speculations. The new program also does a printout of the information. Contact me if you are interested in obtaining a copy.

Stephen Kimmel
4756 S. Irvington Pl.
Tulsa, OK 74135

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Where There's Swill There's No Way

Dear Editor:

Judging from John J. Anderson's "Outpost: Atari" (July, 1983), one would get the impression that graphics are the be-all and end-all of educational software. He talks of all the "amateurish swill" in the educational software market. Then he cites a game software house as the model for educational software producers.

While graphics can be an important element in an educational software package, this overemphasis by Mr. Anderson and others in the computer industry is having some unfortunate effects on the kind of educational software now being developed by the more entertainment-oriented publishers. This graphics-is-everything philosophy is producing the kind of software that I call Fluffware.

Fluffware is a supposedly educational program with little actual educational content, but very strong computer graphics. In some cases, the graphics (which are always crude by print media standards) are not even recognizable by the children they are designed for. Rather, the graphics serve to lure the parents to get them to buy the products. In the short run, Fluffware may force some of the more content-based education off the store shelves.

Our company's position is that computer graphics are never to be used as an end in themselves, but only if they actually enhance the learning process. We start with the educational objectives and then come up with techniques that reach those objectives (including voice accompaniment, workbooks, etc). We try to avoid using the graphics-oriented arcade game as a model for educational software (although if the situation calls for it, we will use it). Rather, we use an interactive audio-visual instruction model. I believe that maturity in the industry will show this to be the correct approach.

John Victor
President
Program Design Inc.
95 East Putnam Ave.
Greenwich, CT 06830

If I gave the impression that all software lacking great graphics is amateurish swill, I sincerely apologize. How I may have come to express that sentiment is a mystery to me, since I could not feel more differently.

What I tried to communicate is a profound disappointment with a few packages on the market today that use the word "education" to mask an inferior product. This does not mean inferior graphics; it means poorly-written and executed programs. It means unhappy and dissatisfied users. It means a continued lack of credibility for the very notion of microcomputers in education.

I wish Mr. Vector and other houses the greatest *success in creating good educational software, with or without graphics and sound. I only hope for reasonable standards of quality.*

—JJA

Righting Writers

Dear Editor:

You concluded the "Dateline: Tomorrow" feature in the July 1983 *Creative Computing* with the taunt, "Perhaps it is time to reinstate our Effective Writing column again. Any opinions out there?" This is one reader who hopes that you are serious.

One of my personal gripes about many programmers is that they tend to be poor writers. I have frequently used segments from Effective Writing when teaching my high school English classes and adult education computer awareness classes. For two reasons I would like to see the column appear once again as a regular feature:

- Computer usage has influenced our language considerably, and I expect that we have just begun to see the extent to which liberties will be taken with our language to accommodate the "computer's need." While those of us who have bothered to understand this phenomenon know the reasons for much of the altering, the majority of the populace do not. If substandard grammar, diction and sentence logic are presented "through the computer," it seems as though we just provide more reason to resist the computer's influence. Please reinstate the Effective Writing column to help programmers see how to write succinctly and with clarity.
- The second reason why I would like to see the Effective Writing column reinstated is that it enhances the quality of your magazine. Several teaching colleagues who have resisted the personal computer's influence have been very impressed with the column. Their opinion of computers and related activities has been visibly enhanced with such a source of quality writing. Please bring back Effective Writing to guide the industry in general and *Creative Computing* in specific.

I thank you for considering these opinions. While I know that a column on gaming or graphics may well sell more copies of *Creative Computing*, this reader will be more likely to stay with *Creative Computing* because it leads other publications in providing me the quality and kind of information which helps me most.

Michael R. Huston
P.O. Box 213
Burdett, NY 14818

Brainstorm

Dear Editor:

When I was in England recently I purchased a Jupiter Ace computer and tested it thoroughly.

There was a serious omission in your review (July 1983). Forth does not ordinarily support floating-point owing to the firm belief of Charlie Moore that everything can be handled in integer, if one takes sufficient pains with the scaling. This is the hard way. For scientific calculations, floating-point is essential.

The Jupiter Ace provides floating-point multiply and divide, which is entirely sufficient—to check it out I wrote a Forth definition (word) for FSIN(x), everywhere good to five significant figures. The Ace suppresses spurious accuracy and displays only digits having meaning—my Basic shows 16 digits for SIN(x) of which at least the last eight are meaningless.

I found the Ace to be quite solid and had no trouble with the cassette interface. In the beginning, Forth is a hard task-master; it is only for people who are willing to test the code they have written to make absolutely sure it is perfect. Forth may be a strict discipline, but there is much satisfaction in having full control, and it pays a substantial dividend in efficiency. This is a great machine for the smartest of the high-school youngsters—for whom it was intended.

Alfred E. Brain
P.O. Box 96
El Granada, CA 94018

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In Love With Lisa

Melvin Merkin

It was a hot summer morning when I first met her. We played all day and I knew then I must have her for my own. My dream came true last month when she moved in with me and we spent four beautiful weeks together. Now she is gone, but I must tell you about Lisa.

Hardware

Lisa is the name of a new computer from Apple Computer. Lisa has been in the press enough since she was first announced last January that I would be surprised if you had not heard of her. I had the privilege of using Lisa for a four week beta test period recently and thought enough of this new computer to put my thoughts to pen. Table 1 lists the vital statistics for all the hardware freaks, but, the numbers don't even hint at the essence of Lisa.

Motorola 68000 CPU
1 Megabyte of RAM
2 871K disk drives
5 Megabyte hard disk with cable
1 Keyboard
High resolution video screen (720 × 364 pixel black on white)
1 Mouse (a pointing device)
2 Serial ports with full duplex channels
1 Parallel port
3 Expansion slots

Table 1. The Hardware.

This hardware together with six software packages (*LisaDraw, LisaWrite, LisaCalc, LisaGraph, LisaList,* and *LisaProject*) costs $9995. In addition you get to choose between two printers: a dot matrix printer for $645 or a daisywheel printer for $2165.

The dot matrix printer needs a $195 parallel interface card since the hard disk uses the parallel port that comes with the machine. The daisywheel printer hooks right into one of the serial ports. The dot matrix printer is better for pictures and the daisywheel is better for words, although they both can print pictures and words.

I bet you're thinking that, "That's a lot of money!" Well, you're right. Lisa is definitely the top of the line in microcomputers. Please keep in mind, however, that the price includes possibly all the memory and all the software you will ever need. Now, you have an easy decision to make: dot matrix or daisywheel printer. My guess is that the decisions will get harder as Lisa matures and more options become available.

Software

"What's so exciting about Lisa then?" you may ask. Although the hardware collection is very powerful, it includes nothing that isn't found in the Xerox Star. The exciting thing about Lisa is the software which comes with it and the way it has been woven into the fabric of the hardware design. It is as if the designers started with the concept of what a computer should do and how it should interface with the user, and worked backward to the hardware design.

Melvin Merkin, 55 Sutter, #361, San Francisco, CA 94104.

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Early Games feature multiple activities, easy to use picture menus, and colorful graphics. The games are fun, children love to play them! That's why they learn from them.

And they're the best reason for having a home computer.

CSI

counterpoint software inc.

Lisa, continued...

Turning Lisa on, for example, doesn't just bring power to the electronics, but invokes a whole series of checks to make sure everything is working properly, initiates a configuration suited to your tastes, and initializes the system to the exact point in the last program you were using when you turned the system off.

The *pièce de résistance* is the mouse. Even though the mouse was not invented by Apple, Lisa will surely popularize it. What is remarkable is the way in which a person using the Lisa mouse can quickly and effortlessly glide through complex conversations with the machine in a most natural way. The mouse is used to point to pictures (or icons) on the screen, and the button is used to either select or grab a picture. These two primitive primate functions of select and grab are used throughout all six software packages.

Three-dimensional figures are produced with delightful ease.

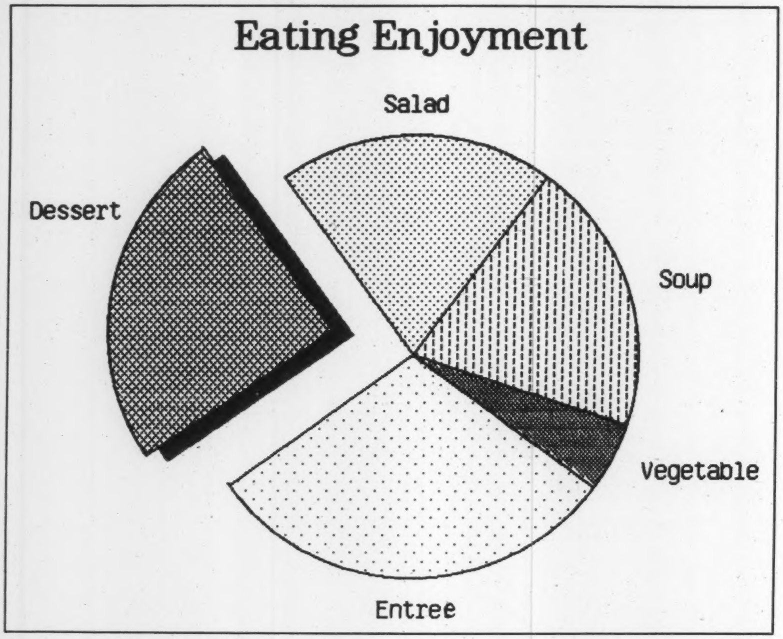
The designers of Lisa have built a machine that is not only easy to use but easy to put together. You don't even need a screwdriver as all the components slide together and snap in place. This makes for easy repair and maintenance. It is no exaggeration to say that Lisa can be unpacked and working within 10 minutes.

Once it is up and running, you will be tempted to start playing with Lisa instead of dutifully going through the interactive tutorial called LisaGuide. A friend of mine was having some difficulty using *LisaCalc.* When I suggested he look in the LisaCalc Reference Manual he said, "That's cheating." Learning how to use Lisa by trial and error is so much fun that to learn it methodically by going through the tutorials provided for each software package seems insipid.

Lisa Draw

This review would be hundreds of pages long if I were to discuss each of the six software packages in detail. Fortunately, I became so engrossed in *LisaDraw* that I gave short shrift to the other five software packages. I had never before seen anything like it.

LisaDraw allowed me to combine the flair of an artist with the skill of a draftsman in creating illustrations for my reports. For me this was an entirely new form of expression which greatly enhanced my ability to communicate my ideas. I am neither an artist nor a draftsman yet I have always wanted to draw my ideas. With *LisaDraw* I can now do this.



Exploded Pie Chart.

In seconds I can throw a circle up on the screen and fill it with tiny hearts. Three-dimensional figures are produced with delightful ease. I had fun drawing my signature then shrinking it and moving it on top of the circle filled with tiny hearts. Can you imagine: a $10,000 doodle pad!

When all of my pent up creative juices subsided I got down to the very serious business of drawing the illustrations for my reports. Figure 1, shows a rather bland example of the type of illustration possible with *LisaDraw.* Anyone submitting patent illustrations would find *LisaDraw* indispensable. The program is the forerunner of personal CAD (Computer Aided Design) systems. What is so spectacular about Lisa is the ability to take an illustration done in *LisaDraw* and paste it into a report prepared in *LisaWrite.*

LisaWrite

LisaWrite is the word processor that comes with Lisa. This is no ordinary word processor but a little typesetting machine. Not only can I choose from a variety of fonts to type in, I can also select the size of my letters, shading, underlining, boldface, italics, etc. After typing the document I can go back and enlarge a word in the middle of the page. Instantly all the words will shift around the page adjusting for the increased length and width of the enlarged word.

I can type on a blank sheet of paper or call up a selection of typing accouterments such as a grid for lining up columns, or a ruler (in inches or centimeters) which shows the margins. The mouse is used to highlight portions of the text for deletion, modification or moving.

At any time I can interrupt my word processing, temporarily put it aside and jump into another application. This is all part of the operating system called Desktop Manager.

LisaCalc is a spreadsheet program in the traditional sense.

LisaCalc

LisaCalc is a spreadsheet program in the traditional sense. The mouse can be used to jump quickly around the spreadsheet and to stretch or compress individual columns. Using the mouse, you can point to a cell, push the button to select the cell, and then move the mouse while holding the button down to highlight a block of cells.

Lisa uses a noun-verb syntax. After highlighting a cell, row, column or block

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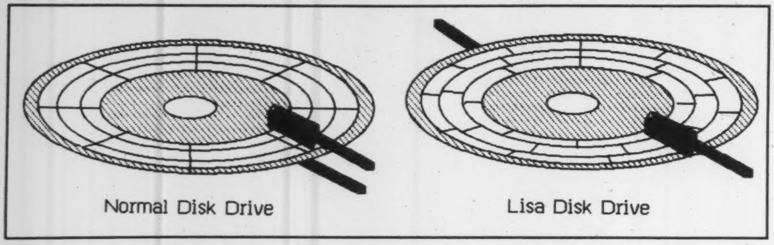

Lisa's Innovative Disk Drive.

(indicating the noun), you tell Lisa what to do (verb) with the highlighted portion. Typically, after composing a nice little financial model in *LisaCalc* you would move a portion of the spreadsheet into *LisaGraph.*

LisaGraph

LisaGraph is a program which produces business graphs from columns of data. The screen is split vertically into columns of data on the left and a graph of the data on the right. Using the mouse, you can easily choose among several views of the data, including pie chart, bar graph, and line plot. If you choose a bar graph representation, you can then choose hidden bars, stacked bars, or side-by-side bars. As you make different selections, the graph on the right of the screen changes instantly.

You can go to the data side of the screen and modify the numbers. This also causes the graph to change before your eyes. The graph will have a title, subtitle, and labels, but you may wish to move the graph to *LisaDraw* where you can add annotation and further illustrations.

The graph will be moved over in an intelligent fashion. For example, after you move the pie chart over, you can "grab" a slice of the pie and drag it partially out of the pie. *LisaDraw* will "know" that the graph is made up of several components which can be individually addressed and modified.

LisaList is a very simple and easy-to-use database system.

LisaList

LisaList is a very simple and easy-to-use database system. Actually, it is too simple to be given the name of database manager and is appropriately named *LisaList* since it operates on lists of records in which each record is composed of many fields. The fields are represented as columns and the records are represented as rows on the screen.

The two basic operations are sorting and selection using a variety of criteria. *LisaList* is certainly easy to use. However, it is unable to perform sophisticated database management functions and, in my mind, is the weakest of the six programs in the package.

LisaProject

I have saved perhaps the best for last. *LisaProject* is a beautiful application. If you are a project manager and have tried to use a computer to help you manage your project you will appreciate *LisaProject.*

LisaProject allows you to work directly on a PERT chart. The critical path is highlighted at all times. You can add new milestones or processes, and the chart is instantly updated. Adding or deleting dependencies is easier than using a pencil and eraser on paper. The bigger your project the more you need *LisaProject.*

It is clear that *LisaProject* was written for the Lisa project herself. You can spend many times the cost of the full Lisa system on a mainframe project management system written for 80-column punch cards. If you are in charge of a large project, run, don't walk, to your nearest Apple dealer and try *LisaProject.*

Drawbacks

Nobody's perfect, not even Lisa. I have a list of complaints which bear airing. First and foremost, Lisa is slow. The actual calculation speed is fast enough to make you believe there is a 68000 under the hood, however, the user-friendly system really eats up machine cycles. It seemed as though it took Lisa a full five minutes just to turn herself on and check herself out. I got in the habit of simply leaving Lisa on all the time. I lost my guilt when I found out that one of the designers of Lisa had his on for six months straight and suffered no ill-effects.

The screen automatically dims after a few minutes of idleness. Just touching the mouse or keyboard will bring the screen back to life.

Switching from one application to another seems to drag on forever (about two minutes). Once you are in an application though, Lisa moves along briskly. Especially frisky is the speed at which pictures are drawn on the screen.

Another complaint about the set of six programs is that they all are fixed and cannot be programmed in any sense. For example, in *LisaWrite* there are about ten different fonts, but I couldn't define my own. There is a pre-defined set of characters; I couldn't create the beta character, for example.

In *LisaDraw* there are about 50 tessellation patterns, but darned if I could create my own. I got the feeling that the designers thought they knew what was right for me. Even though the six programs are easy to use and of the finest design, I hope future releases will give the user more control.

LisaDraw was my favorite, and I know I am tempting fate by suggesting an improvement, but I found myself on many occasions wanting to rotate a picture I had drawn. Also, Lisa is a black and white machine. I would love to see a color version.

It is clear that* LisaProject *was written for the Lisa project herself.

Innovations

Lisa is touted by Apple as a revolution in computer technology. I agree with them. If I had to choose between a multimillion dollar IBM 3083 or a Lisa, I wouldn't hesitate to ask for the Lisa. Microcomputers were catching up to minicomputers a year ago, but have now passed mainframes in many important respects.

The big mainframes aren't used by the average person because they are very difficult to use. They don't have a mouse or the picture drawing speed of the Lisa. I predict that people will soon use microcomputers, and microcomputers will use mainframes.

I think the biggest innovation represented by Lisa is the integration of all the programs—with each other and with the hardware. Other vendors are quickly picking up on this integration theme. It is a very difficult task to accomplish but a worthwhile goal for all future systems. Even if Lisa is not successful (I think it will be), it has set a new standard which will affect all future computer offerings.

The disk drive is another innnovation,

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Another marketing first from MICRO D.

CIRCLE 211 ON READER SERVICE CARD

Inside Apple

Vol. 1, No. 3

Apple's new Monitor II. A sight for sore eyes.

If you've been using a TV as a monitor, perhaps you can get a friend to read this for you:

Apple's brand new Monitor II will improve your vision.

It features all the latest ergonomic improvements in monitor technology.

For example:

Studies have shown that the leading cause of eye fatigue for computer users is lack of contrast between the displayed characters and their background.

So we designed the Monitor II around a high contrast green phosphor CRT that provides an extremely dark background. That means you can read text at a lower brightness. And that means you can be more productive — working longer and more comfortably.

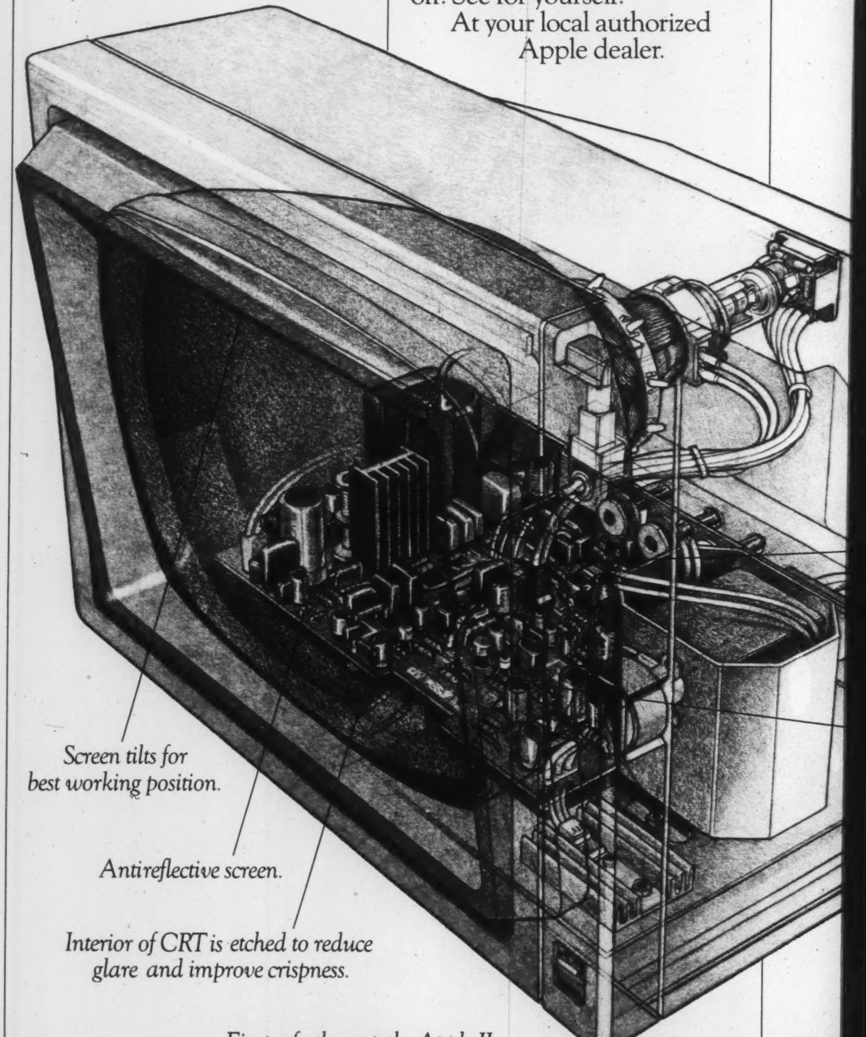
Toward that same end, we also gave Monitor II a tilt screen. So you can angle it perfectly for your working position, without scooting your chair around or sitting on phone books.

And we made that screen antireflective to reduce glare from ambient light.

Monitor II also features a high bandwidth video amplifier and a high tolerance linearity circuit. The former keeps characters from smearing on the screen and eliminates the annoying "ghosts" left by a fast moving cursor. The latter keeps characters crisp, legible and prevents "keystoning" right up to the edges of the display. Both add up to superior display of 80-column text and extremely accurate graphics.

Designed as the perfect system partner for the Apple® IIe Personal Computer, Monitor II requires no monitor stand. It's a perfect fit, aesthetically as well as technically. So it's pleasing to the eye even when it's turned off. See for yourself.

At your local authorized Apple dealer.



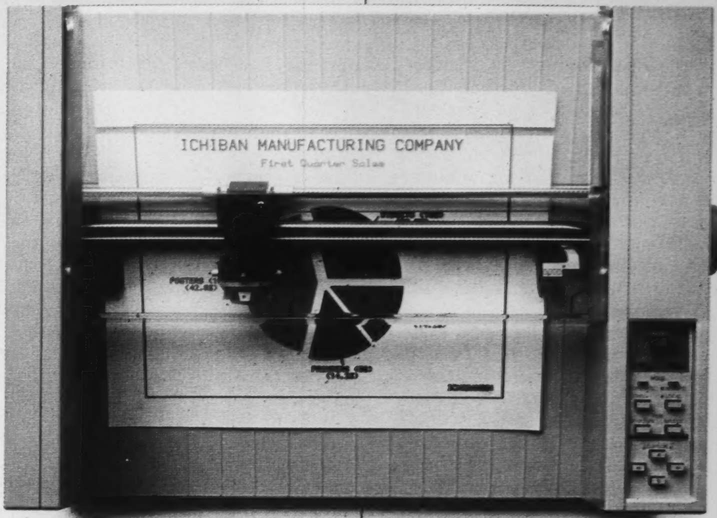
Screen tilts for best working position.

Antireflective screen.

Interior of CRT is etched to reduce glare and improve crispness.

Fits perfectly atop the Apple IIe.

Now Apple plots color.



Since color graphics are becoming ever more important in business, we've been hearing more and more calls for a color plotter as reliable as an Apple.

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Apple's new Color Plotter can generate all kinds of presentation graphics, engineering drawings or anything else you have to illustrate in up to eight brilliant colors.

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There are two color plotter accessory kits to choose from to assure a perfect marriage with your Apple II or IIe, or Apple III.

Each kit comes with eight color pens — red, blue, green, black, burnt orange, gold, violet and brown. Plus a starter package of plotter paper. Plus all the manuals, documentation and cables appropriate to your particular kind of Apple. So you can get up and coloring right away.

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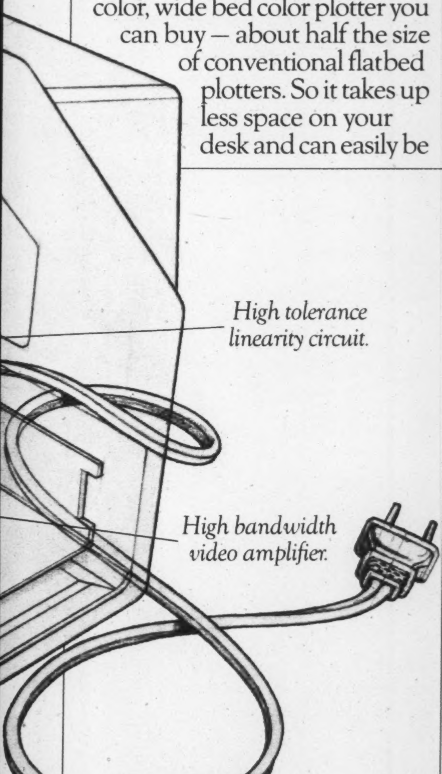
As you might expect, all of the above is available at many of our authorized Apple dealers.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CIRCLE 114 ON READER SERVICE CARD

Lisa, continued...

albeit of lesser importance. Apple has redesigned the disk drive to hold more data and to be more fault tolerant. The sector sizes are all uniform in contrast with the standard design in which the ones on the perimeter are wider than those near the center. To accomplish this feat, the designers have the diskette rotate at a variable speed depending upon the distance of the read head from the center. Instead of a constant hum you hear a little tune whenever the disk drives are reading and writing.

The other important difference is that the two read/write heads are 180 degrees apart instead of being together. This means that the diskettes need two oblong holes in the jacket instead of one. This change means that the diskettes will last longer and be less prone to errors. However, I feel it was a mistake to create a non-standard design especially in light of the new 3″ diskettes becoming popular.

Other innovations include the one-button mouse. Mice previously have had two to four buttons. It was quite a stroke of genius to come out with a mouse with only one button. The one button makes things much easier to use since, when in doubt people will simply pass the one button and see what happens. With two or more buttons the user might hesitate to press a button for fear of pressing the wrong one. Lisa cheats a little on the elegance of the one button design by allowing shortcuts like clicking the button twice in rapid succession for "advanced" commands.

Lisa has many tricks up her sleeve. One of the features announced is the inclusion of a serial number and a unique random number built into the ROM. These two little numbers will allow total and absolute copy protection on future software. Also by checking the serial number, a program could adjust to past hardware modifications. Apple could reserve a whole sequence of serial numbers for a large company and then sell software which works only for that set of machines. The unique random number will undoubtedly be used for security to protect the Lisa owner, say, in home banking applications.

I used the first release of Lisa. Lisa is sure to grow. I suspect that Lisa will really shine when she adds AppleNet to her repertoire, allowing her to talk to other Lisas as well as Ethernet.

Apple has always encouraged third party software, and I see no reason for them to change their strategy. Apple will be offering tools to software developers allowing them to have their programs make use of the mouse and draw pictures on the screen. More important, these tools will allow third party vendors to develop applications which will integrate with the six LisaSeries programs as well as with any other applications using the prescribed methodologies.

Can I recommend Lisa for you? No, I can recommend only that you go to your nearest Apple dealer and try Lisa, because no amount of explanation can describe her. Like love, Lisa must be experienced. ☐

"Until I see this Supreme Court ruling, Bobby, I'm afraid I can't condone throwing Lisa Nichols into a volcano."

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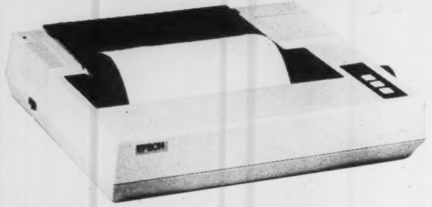

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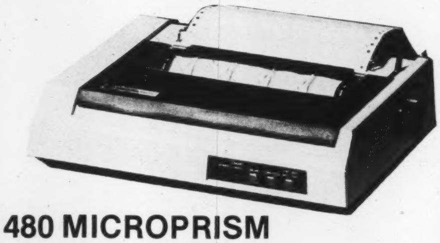

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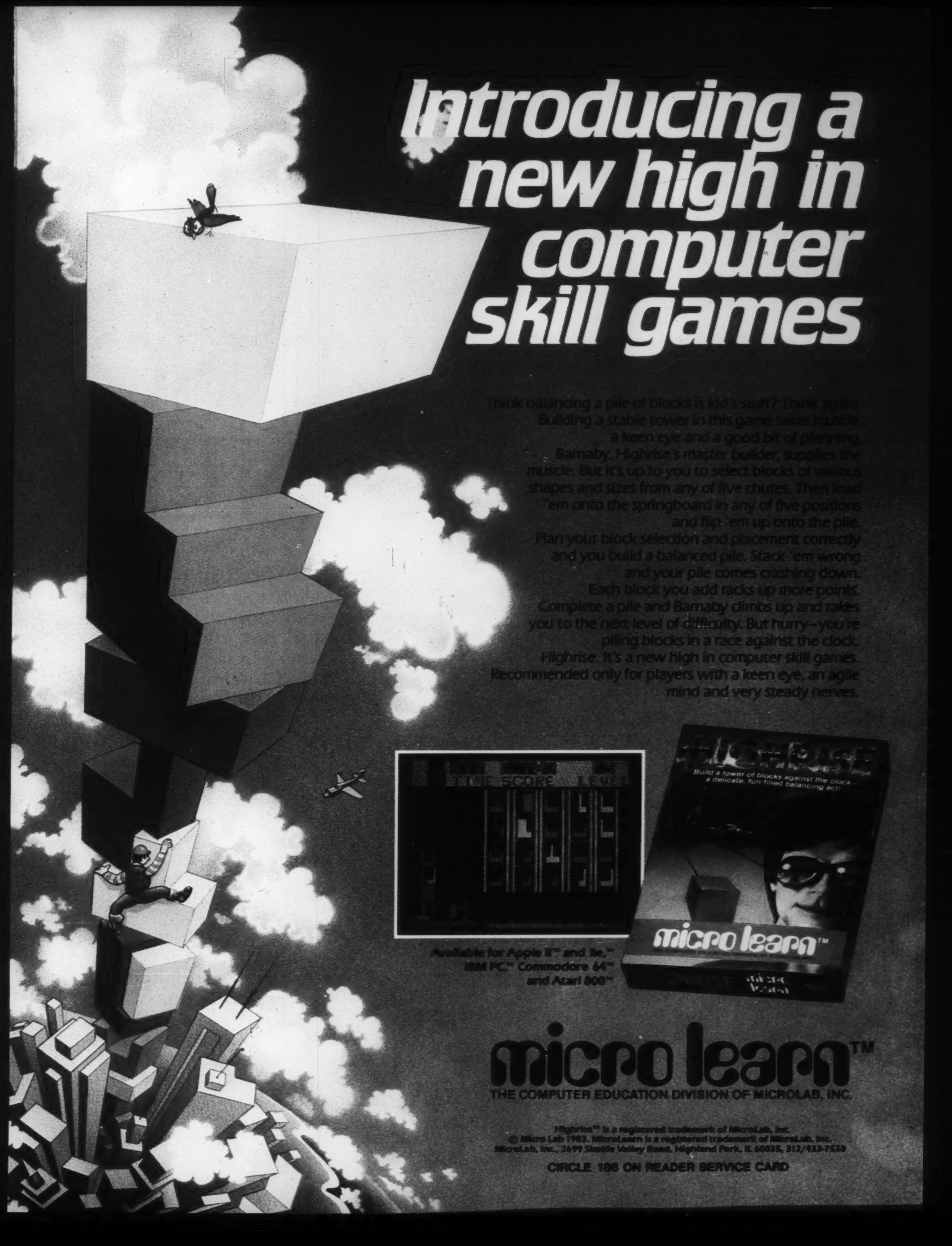
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CIRCLE 186 ON READER SERVICE CARD

HOW TO UNSCR YOUR NEST

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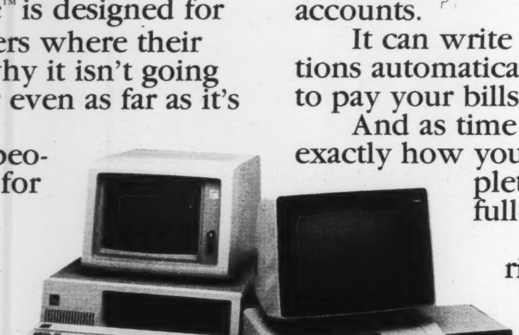
And if you've read this far, it's designed for you.



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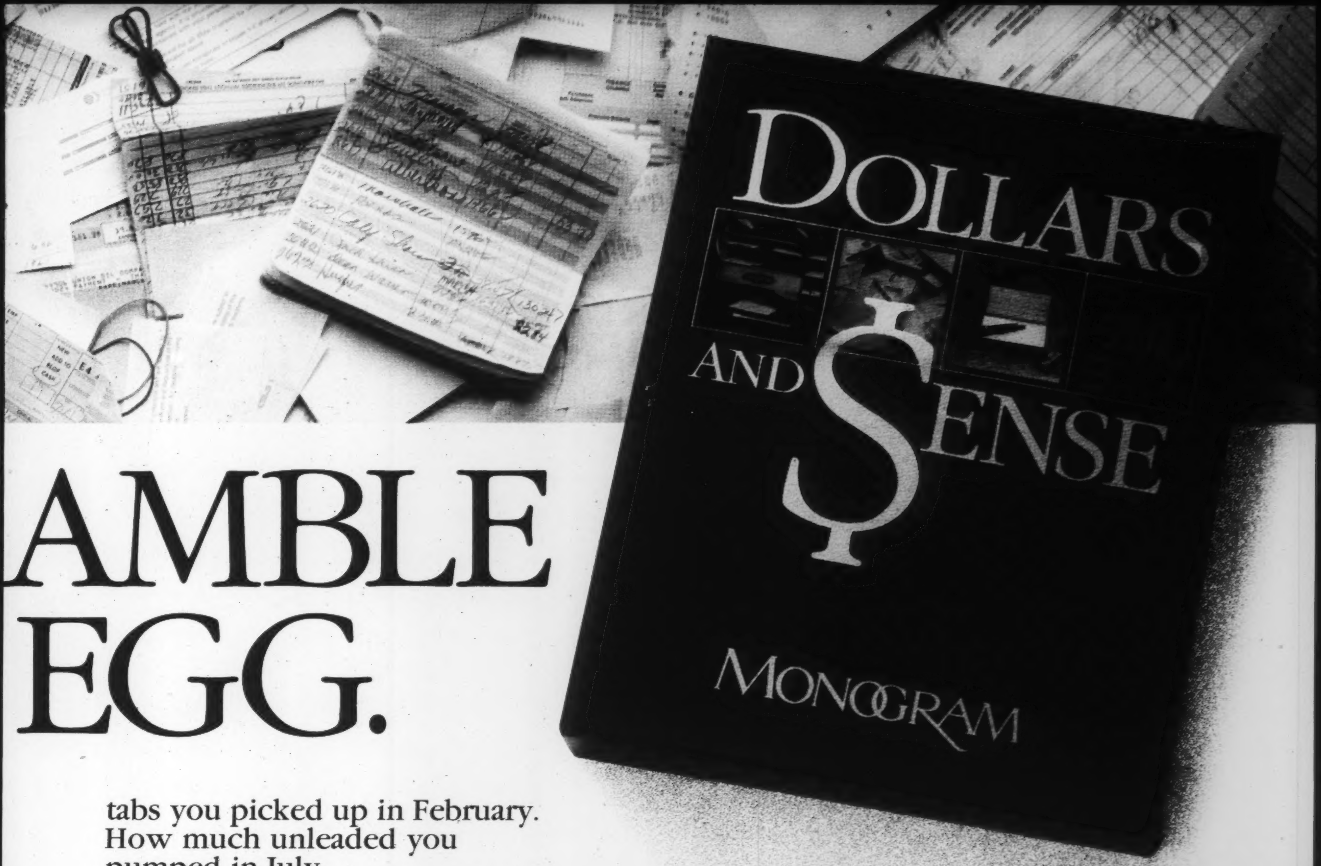

AMBLE EGG.

tabs you picked up in February. How much unleaded you pumped in July.

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And one more thing. Dollars and Sense is tax-deductible.

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CIRCLE 265 ON READER SERVICE CARD

creative
computing
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evaluation

TRS-80 Model 4

More Business Oriented Than The III

Stephen B. Gray

Radio Shack's new 8-bit computer, the TRS-80 Model 4 replaces the Model III and is compatible with not just one, but with two operating systems, TRSDOS 6.0 and CP/M Plus. (It is also compatible with TRSDOS 1.3 and LDOS, but more about that later.)

Thus the user can run all the programs written for the Model III, and also the more than 3000 programs written under CP/M.

On The Outside

From the outside, the Model 4 looks very much like the Model III, except that more of the control keys are white; there are some additional keys; the case is a different color; and the display holds more characters.

The Model III case was made of an opaque plastic sprayed with an aluminum-color paint that rubbed off all too easily. The cream color of the Model 4 case is molded in and is therefore permanent.

The additional keys are CTRL, CAPS, and the three function keys in the numeric keypad, F1, F2, and F3. CAPS locks the display into either upper- or lowercase and affects only the alphabetic keys. CTRL, used with other keys, provides a set of control commands in the same way the SHIFT and CLEAR keys do. For example, reverse video, which puts white characters on a black background, is enabled by CTRL-P.

Display

The display is schizophrenic: run a Model III program and the screen shows 16 lines of 64 characters each. But boot up Model 4 TRSDOS 6.0, and the video shows 24 lines of 80 characters each.

There will be Model 4 software, such as word processing and spreadsheet programs, that uses the 80-column format.

The Model 4 characters are smaller, of course, to fit in the same screen area: they are 10 to the inch horizontally and 4 to the inch vertically, as compared with 8 horizontal and 2.57 vertical characters to the inch on the Model III.

Double-width characters can be displayed, as in the Model III, except that there are 40 to the line.

Graphics Characters

Like the Model III, the Model 4 can display 64 graphics characters, which represent all the combinations of six pixels in a rectangle two across and three down. Twenty-six of the 64 graphics characters can be displayed using combinations of CTRL/CLEAR with alphabet keys. This means graphics can be put directly into strings or PRINT lines when writing programs.

However, only 51 of the 64 graphics characters can be entered from the keyboard using various control keys. So unless you can create your graphics with only those 51, you must use a program that stuffs graphics characters into strings or into PRINT lines.

Stephen B. Gray, 219 W. 81st St., Apt. 7C, New York, NY 10024.

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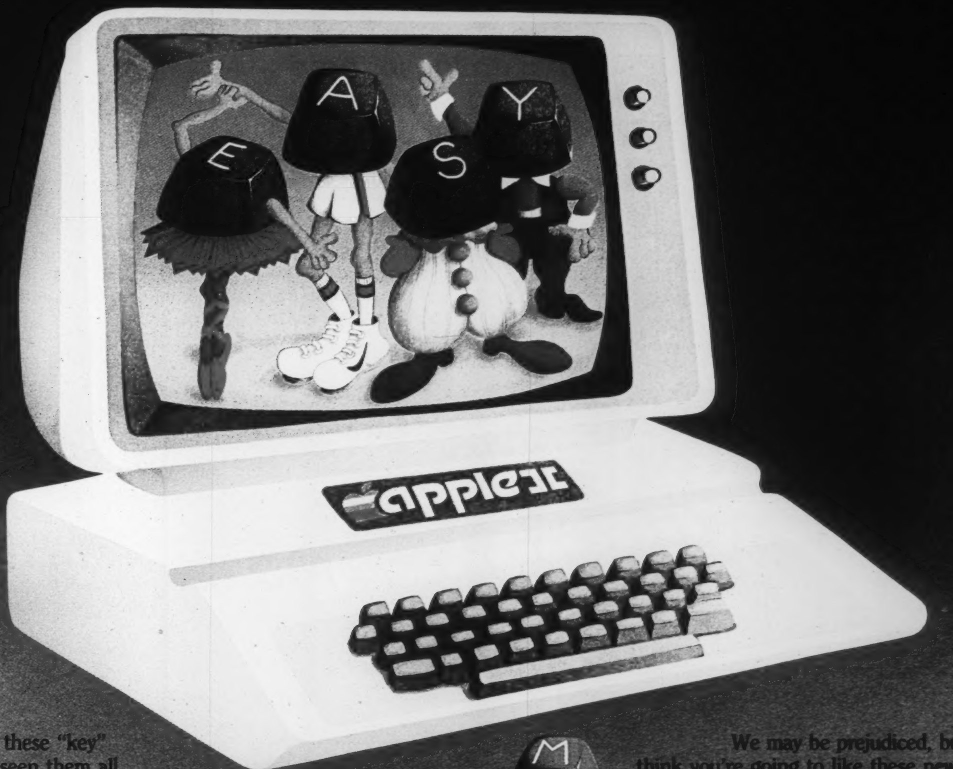

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And if you want to meet even more new characters, the optional Function Strip™ will introduce you to 16 brand-new keys across the top of your keyboard which are yours alone to define. (These characters will never get mixed up with characters from the keyboard!)

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The Enhancer II and Function Strip can be used with any Apple with a keyboard encoder board.

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CIRCLE 295 ON READER SERVICE CARD

You can't use SET and RESET to turn graphics pixels on and off, or POINT to test for their presence, because Model 4 Disk Basic doesn't have those commands. It has no graphics functions at all, other than CLS, which clears the screen. So if you want to create SET/RESET graphics on the Model 4, you must do it in Model III mode.

To make the Model 4 graphics situation really weird, the bottom two pixels in the six-panel graphics character rectangle are only half as high as the upper four (Figure 1). This makes for some odd-looking, highly unsymmetrical graphics. The short-legged graphics characters are, of course, the result of the increase in numbering rows from 16 to 24; there just isn't room for graphics characters of Model III height.

Display characters, whether letters, numbers, or graphics characters, are created by increasing the brightness of small sections of the horizontal rasterlines.

The graphics area is 6.25" high. In the Model III, those 6.25 inches encompass 200 raster lines. Divide the 200 by the 16 lines of characters, and you theoretically have 12.5 raster lines available for each graphics character. If the graphics characters are made 12 raster lines high and the characters are three pixels high, then each pixel is four raster lines high.

To squeeze 24 lines onto the Model 4 screen, more raster lines per inch are required, so a higher resolution raster display is used, with 250 raster lines in those 6.25 inches. Dividing 250 by 6.25 gives 10.4 raster lines per graphics character. It might have been possible to cut the pixels down to three raster lines in height, and thus produce graphics characters nine raster lines high, which would have been symmetrical, but then they would have looked quite different from Model III graphics.

The designers elected to leave the top two pairs of pixels in the graphics characters at four raster lines in height, and reduce the bottom pair to two raster lines high. Thus the top two-thirds are the same, but the bottom third of all graphics characters is short-legged.

Function Keys

The three function keys aren't described in the Model 4 manuals, but an addendum sheet tells what they do in Model III mode. F1: "pause program execution" (same as SHIFT/@). F2: "leave insert mode and return to normal Edit Mode" (same as SHIFT/up-arrow). F3: "erase last character typed" (same as left-arrow).

The addendum sheet doesn't say that in Model 4 mode, the three function keys can be used with INKEY$, just like any other key. The decimal code for F1 is 129; for F2, 130; and for F3, 131. So you should write:

```
100 A$=INKEY$: IF A$=CHR$(129)
 THEN 180 ELSE 100
180 PRINT "KEY F1": GOTO 100
```

or something to that effect.

The question is: what do these three function keys do for you that other keys won't? Well, they let you perform those Model III mode operations with one key instead of two. And they can be "reserved for special applications," according to a member of Radio Shack's Model 4 Support Group in Fort Worth, hinting that future programs from Fort Worth will specify the use of the function keys, just as they do on the Model II/12/16.

The questions is: what do these three function keys do for you that other keys won't?

Model 4 Operating Systems

The TRS-80 Model 4 is compatible with several operating systems: TRSDOS 6.0, TRSDOS 1.3, LDOS, and CP/M Plus. This may sound complicated, but it really isn't: the first three have a close family relationship.

Radio Shack's first disk operating system, TRSDOS for the Model I, was written by Bill Schroeder. He later left Radio Shack and started his own software company, Logical Systems Inc., in Mequon, WI. His company's disk operating system for the TRS-80 is called LDOS, which stands for Logical Disk Operating Systems.

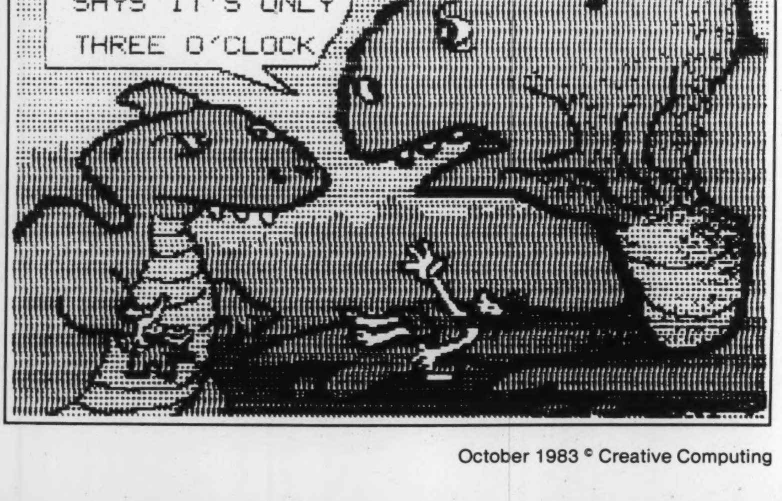
In a recent Logical Systems advertisement, version 5.1 of LDOS for the Model I and III is offered at $129, "reduced from $169."

Now the plot thickens. Look in a recent Radio Shack catalog for the Model I/III hard disk drive, and you will note that it says the "operating system enhances familiar TRSDOS commands with convenient hard disk features." Because TRSDOS didn't have any hard disk commands, Radio Shack found it easier to offer LDOS 5.1.3 for use with the hard disk drive than to create a new TRSDOS in Fort Worth.

Starting with catalog RSC-9, dated 1983, Radio Shack offers (p. 28) the LDOS "advanced operating system that offers the TRS-80 user many features and enhancements that are not included in TRSDOS . . . . Includes a Job Control Language to control an unattended computer, a terminal utility, keyboard typeahead, printer spooling to memory and/or disk, a printer output formatting program, and device independence—linking, routing, and filtering." Radio Shack's price for LDOS is, of course, $129. There are two versions, one for the Model I, the other for the Model III.

When you turn on the Model 4, the first display says "TRSDOS 6.0.0—Copyright 1983 Logical Systems Inc. . . . Licensed to Tandy Corporation." TRSDOS 6.0 includes a Job Control Language, and is substantially the same as LDOS; they are code compatible. Forty-three commands are common to both LDOS 5.1.3 and TRSDOS 6.0; nine more are found only in TRSDOS 6.0, and 13 others are found only in LDOS 5.1.3.

TRSDOS 1.3 is the operating system used by the Model 4 when in Model III mode.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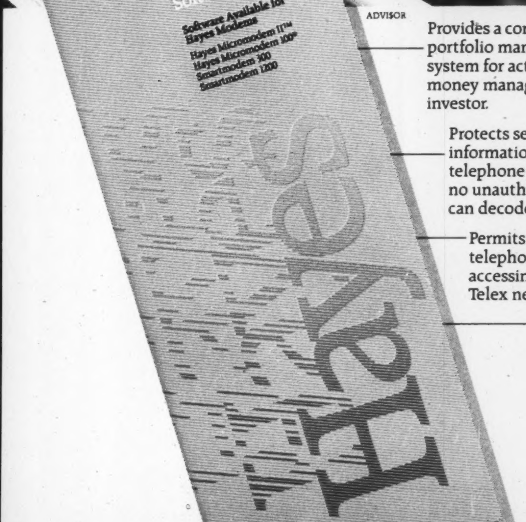

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CIRCLE 170 ON READER SERVICE CARD

CP/M Operating System

CP/M stands for Control Program/ Microcomputers; it is distributed by Digital Research, Inc., of Pacific Grove, CA. CP/M Plus is a version created for 8088/Z80-based systems.

For a long time, CP/M was the only disk operating system around. It had unique features, such as being, for some time, the only relocatable operating system that could run on computers with memories ranging from 16K to 64K. This and other such features led to its becoming the standard DOS for 8-bit machines. And thus a large amount of software was generated to be run under CP/M.

Back in July 1979, the first item in my TRS-80 column (p. 112) said:

"Radio Shack has officially killed the idea of using CP/M on the TRS-80. There is no suitable way of relocating CP/M from the low end of memory, and CP/M expects I/O vectors at 0 to 100 hex."

That was over four years ago. Since then, many TRS-80 users let it be known that they wanted to be able to use the large library of CP/M programs available. So Radio Shack came up with the Model 4, which is compatible with the two different operating systems, TRSDOS 6.0 and CP/M Plus. CP/M needs 64K to operate in, which is why the Model 4 has a minimum 64K memory.

Curiously, although the Radio Shack catalogs and brochures say that the Model 4 will run under CP/M Plus, there is not a single mention of CP/M in the three manuals supplied with the Model 4.

Job Control Language

JCL does a lot more than just "control an unattended computer." It consists of TRSDOS commands, macros, and special symbols, which you use to create a JCL file, using the BUILD and DO commands, *Scripsit,* or a Basic program.

Some of the JCL macros are PAUSE (suspend execution, display a message), FLASH (flash a message on the screen a specified number of times), and INPUT (input a line of information from the keyboard).

JCL lets you write programs that do much more than just perform a calculation. As the name implies, they control an entire job, performing a variety of functions. You construct a sequence of commands and statements that control the action of the operating system and/or applications programs. For example, you could create a JCL file that shows you a directory, then loads Basic, runs a program—all automatically, initiated by a single command line.

(BUILD is also in Model III TRSDOS 1.3, for creating an automatic command input file that can be executed via the DO command. TRSDOS 1.3 also contains PAUSE.)

TRSDOS 6.0

TRSDOS 6.0 has some interesting commands not found in Model III TRSDOS 1.3. These include:

- CLICK: A keyboard filter gives the keys a "click" sound when they are pressed.
- COMM: Lets two computers communicate via a defined device. This terminal program includes disk file send and receive, and modem support including 1200 baud.

JCL does a lot more than just "control an unattended computer."

- FILTER: Modifies data as they are read from or written to a device, for a particular application, such as altering printer output.
- MEMDISK: Lets you set aside part of the available RAM memory to function as a pseudo floppy disk drive that responds "keystroke-quick" rather than at the slower disk access speed. You can COPY, BACKUP, PURGE, and display the directory of MEMDISK files.
- REPAIR: Updates and modifies information on Model I TRSDOS disks to make them readable under TRSDOS 6.0. (Use CONV for Model III disks.)
- RESET: Returns a device to its original startup condition. Closes open files if given a file specification.
- ROUTE: Routes one device to another device, disk file, or to nothing (NIL).
- SETKI: Sets the keyboard repeat rate and delay parameters.
- SPOOL: Permits printing data while performing other operations, such as writing a Basic program.
- SYSGEN: Creates a configuration file to store information about the way your system is set up.
- TAPE100: Lets TRSDOS 6.0 read a Model 100 cassette tape file and write it to Model 4 disk as an ASCII file, or read a disk file and write it as a Model 100 tape file.
- VERIFY: Turns the verify function on and off. When verify is on, TRSDOS reads the data it writes to disk to verify that the data are readable.

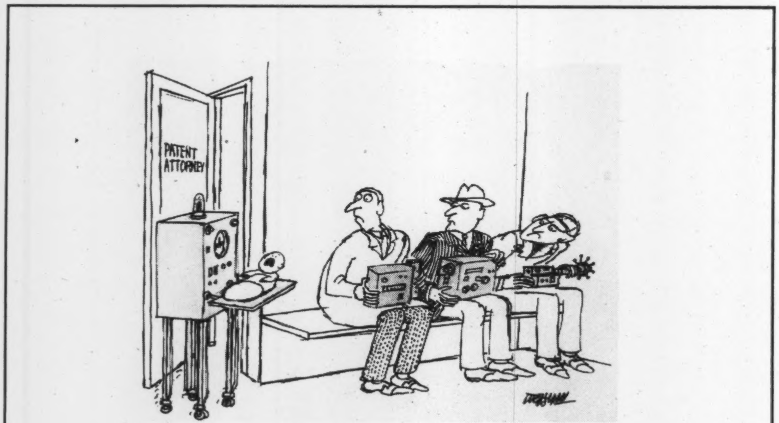
TRSDOS 6.0 allows you to assign strings to the alphabetic keys, so you can enter often-used TRSDOS or Basic commands with a single keystroke, to speed up your programming.

TRSDOS 6.0 sorts directory listings alphabetically by filename. It also includes the FORMS command, which sets up printer parameters to let you tailor printouts and handle preprinted forms. You can change the number of lines per page, set margins, set page length, indent, and perform other similar word processing-type functions.

Someone must have felt that the KILL command, for deleting specified files from the disk directory (to free the disk space for other uses) sounded too bloodthirsty. In TRSDOS 6.0, this function is now called REMOVE. But KILL still exists in Model 4 Disk Basic.

Model 4 Basic

The Basic for the Model 4 is a new Microsoft version. It permits 40-character variable names. That is, the first 40 characters of a variable name are consid-



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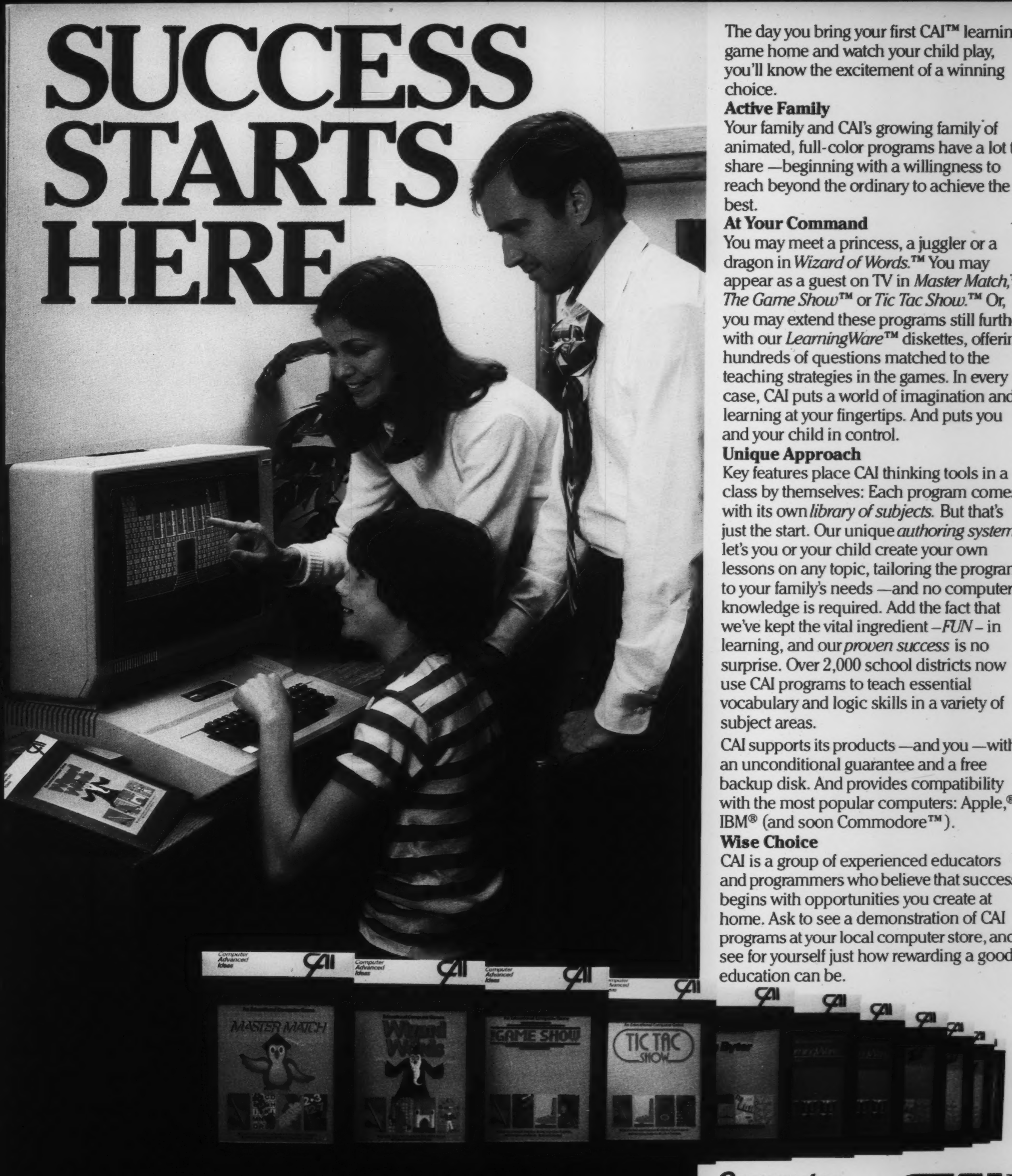

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CIRCLE 130 ON READER SERVICE CARD

ered significant. In Model III Basic, only the first two characters of a variable name are significant.

Some of the new and interesting statements and commands found in Model 4 Basic are:

- COMMON: Passes one or more variables to a chained program.
- CHAIN: Loads a Basic program, chains it to the main program, and begins running it.
- WHILE/WEND: Executes a series of program statements in a loop for as long as a given condition is true.
- WAIT: Suspends program execution until a machine input port contains a specified value.
- WIDTH: Sets the line width for printing on the display or on a printer.
- DATE$: Returns the current system date.
- ERRS$: Returns the number and description of the most recent Basic disk-related error.
- HEX$: Calculates the integer hexadecimal value of the number specified, and returns the value as a string.
- ROW: Returns the current vertical (row) position of the cursor on the display.

Some of these are taken from Model II Basic. Some of the Model III Basic statements and commands not found in Model 4 Basic include all 15 CMD functions (such as CMD "Z" to duplicate the output to display and the printer), and the cassette statements CLOAD, CLOAD?, CSAVE, INPUT#-1, and PRINT#-1.

Sound

Although the Model 4 brochure says the computer has sound ("obtainable from Basic with sound command including tone and duration"), somehow it got left out of the Model 4 manual.

Model 4 sound is programmed just like the TRS-80 Color Computer sound: using SOUND F,D where F specifies the frequency, and D the duration. However, Color Computer sound is meant to be used for creating music as well as sound effects, so both its F and D range from 1 to 255.

Model 4 sound is meant only to be used to "signal a business alert," as one Computer Center salesman put it. The frequency ranges from 0 to 7, the duration from 0 to 31.

Musically, the eight tones range from C to G-sharp, omitting the E. There may be some tunes you could play with this two-thirds of an octave, but I didn't spend much time trying to find them.

With a duration of 0, a tone is sounded for about 1.5 seconds; with a duration of 31, about 12 seconds.

The range of frequencies and durations permits you to write a variety of "business signals" similar in function to Army bugle calls that sound reveille, chowtime, and charge. You could have each error condition play its own little tune, a few notes to let the operator know there is a "device in use," "disk space full," or "out of data" problem.

Manuals

Three manuals and a quick reference guide are packed with every TRS-80 Model 4. One has been around for a couple of years, *Getting Started With TRS-80 Basic: For use with Models I & III.* The other two are new, for the Model 4.

A Model III Owner's View of the Model 4

David H. Ahl

As many of you know, *Creative Computing* has been a heavy user of Radio Shack Model I and III computers for quite some time. Much of the editing of the magazine is done with the *Electric Pencil* word processing package on the Model III and our typesetting machines were originally driven by Model Is; they have now been replaced by LNW machines, among the most reliable computers around.

In any event, when TRSDOS 1.3 was announced, we elected, for the most part, to continue to use TRSDOS 1.2 since we had such a large library of files (over 100 disks). Unfortunately Radio Shack did not provide any easy means of updating 1.2 files to 1.3 except he cumbersome XFERSYS utility in later releases of TRSDOS 1.3.

Unfortunately, this now prevents us from using the Model 4 at all. The Model 4 does not run TRSDOS 1.2, nor is any means provided to convert 1.2 files.

Steve Gray's writeup may lead you to believe it is easy to run TRSDOS 1.3 Model III software on the Model 4. It is, as long as you are content with emulation mode, but considerably less easy if you want to take advantage of the Model 4 features. Indeed, many programs just plain will not convert to the Model 4 using the Convert utility. For those programs, you are stuck with Model III emulation mode.

Although the documentation that comes with the Model 4 is an improvement over that of its predecessor, it is still a far cry from what we would rate as "user friendly." Only the 45-page introductory manual and 38-page Quick Reference Guide could be considered friendly; the other two manuals seem more designed to encourage experimentation and more than a little frustration.

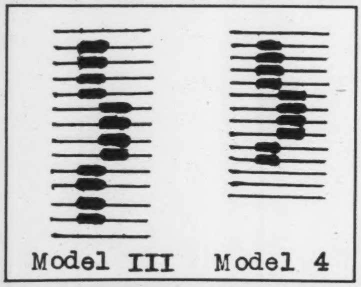

Figure 1. The bottom pair of pixels in Model 4 graphics characters are only half as high as the other two pairs.

Along with the Model 4, Radio Shack offers a rather complete line of hardware—modems, printers, plotters, and the like. However, we feel that the customer should be able to make up his own mind what printer or modem he wants to use. Unfortunately, Radio Shack doesn't encourage this sort of thing at all. You say you want to hook up a non-Radio Shack something or other to the RS-232 port? Lots of luck figuring out which are the active lines or whether the port adheres to the industry standards (it does—more or less).

While the manual tells us that "the RS-232C port lets you communicate with another computer, a modem, or a serial printer," it is extremely short on the details of how to do this.

Bottom line: at first glance, the Model 4 looks like a very nice improvement over the Model III, but Model III owners will want to think long and hard before upgrading to a Model 4. Many programs will have to be run in emulation mode; the documentation is only slightly better than that of the Model III; and software in anything but TRSDOS 1.3 and LDOS will not run at all (yes, your Big 5 games will run). Also, easily running non-Radio Shack peripherals remain an elusive dream.

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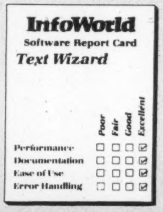

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TRS-80 Model 4, continued...

Introductory Manual

So that the new computer users won't panic at the sight of a huge manual, Radio Shack has included a nice little 45-page manual—actually more of a booklet—"Introduction to Your Disk System: TRS-80 Model 4."

This manual is full of drawings and examples, and is designed for beginners. It shows, simply and carefully, "how to set up the Model 4, how to use important commands, how to run application programs, how to store information, and what to do in case of trouble."

The seven chapters cover How Computers Work, Getting to Know Your Model 4, Using TRSDOS to Prepare Disks, Running Application Programs, Learning to Program in Basic, In Case of Trouble, and That's Just the Beginning. That last chapter gives a peek at some application programs, other languages, some other TRSDOS commands, and operating systems.

The application program described in Chapter 4 is MailList, which is provided on the TRSDOS disk. The user learns how to enter names and addresses, change or delete them, list them, and copy the disk file to another disk. MailList is handy for teaching the basics of interacting with a simple application program, and can also be used "for real."

Model 4 Disk System Owner's Manual

The 486-page looseleaf Model 4 Disk System Owner's Manual consists of three sections: TRSDOS, Basic, and 11 appendixes.

The TRSDOS section is different from the Model III TRSDOS manual, mainly in that much more information is given. The 142 pages are devoted to 44 commands, as compared with 60 pages covering 35 commands in the TRSDOS 1.3 manual. The description of commands that are the same on the two computers have been rewritten and expanded, adding helpful information.

The Basic section combines what the Model III manual provided in two pieces: a bound volume called Operation and Basic Language Reference Manual and 65 looseleaf pages on Disk Basic. The tutorial section on Basic Concepts is taken unchanged from the Model III manual. It is unfortunate that this section wasn't also expanded, because more information is needed in several areas, such as logical operators, which get only one page.

The appendixes cover Job Control Language, Model 4 Hardware (technical specifications), Character Codes, Error Messages, Converting TRSDOS Version 1 Programs to TRSDOS 6.0 Programs, Basic Keywords, Basic Worksheets, Glossary, five brief TRSDOS programs, Basic Memory Map, and Using the Device-Related Commands.

Although it provides more information, the Model 4 Disk System Owner's Manual is printed from typed pages, and thus isn't as elegant or quite as easy to read as the typeset Model III manual.

Quick Reference Guide

The Model 4 Quick Reference Guide is much more extensive than most other such TRS-80 guides. Its 38 pages provide information on Startup, TRSDOS Commands, Utilities and Error Messages, and Basic Statements and Functions, Control Keys, Operators, Edit Commands, Special Characters, Error Messages, and Internal Codes.

Three Models

The 4 comes in two 24-line disk models: with 64K of RAM and one disk, at $1,699; with 64K, two disks and RS-232C, $1,999. A 16K cassette-based starter system, displaying 16 lines on the screen, running Model III Basic, and without disk drives, is $999. The internal RAM memory of the disk models can be expanded to 128K with a $149 64K RAM kit.

Many students of engineering, science, and mathematics are buying the Model 4.

The Model 4 prices do not include Model III TRSDOS 1.3 or CP/M Plus system disks. You get one system disk, the Model 4 TRSDOS and Basic Interpreter. Although the RSC-9 catalog doesn't mention it, there is a Model III TRSDOS 1.3 system disk available for $14.95, catalog number 26-0312. The CP/M Plus system disk for the Model 4 wasn't available at this writing, nor had an availability date been set.

I have heard that there is a special 48K version of the Model 4 for schools, with an RS-232C interface, no disk, and a special ROM, configured for the Network 3 Controller that connects up to 16 Model 4 student stations to a teacher's "host" system.

A Model 4 Upgrade Kit ($799 plus installation) converts a Model III to a Model 4, except for the cabinet, disk drives, and CRT. It includes a new keyboard, CPU board, 64K RAM, sound, TRSDOS 6.0, and Disk Basic.

Bit-mapped high-resolution graphics cost less for the Model 4 ($249.95 plus installation) than for the Model III ($369.95 plus installation). This is because some of the required hardware is already in the Model 4. The hi-res package includes a Graphics Basic with commands like PAINT, LINE, and CIRCLE, to simplify creating graphics.

The Model 4 operating speed is also schizophrenic. It uses a 4-MHz clock rate in Model 4 mode, but the 2-MHz rate of the Model III when operating in Model III mode.

To operate Model III software, the Model 4 contains a Model III ROM. Thus TRSDOS 1.3 runs on the Model 4 without changes.

The Bottom Line

The TRS-80 Model 4 is more of a business computer than the Model III, and many are being bought as executive computers. The Job Control Language permits it to work unattended after business hours. And the Model 4 runs programs written for it twice as fast as the same programs written for the Model III.

Many students of engineering, science, and mathematics are buying the Model 4. (Some students, who can afford a more expensive computer, and who don't feel challenged enough by the Model 4, are buying the Model II.)

The Model 4 appeals to a broader market than the Model III because it can run CP/M programs, displays 24 lines of 80 characters, and has more memory. It fits into the TRS-80 product line between the superseded II and III; the Model 4 does all the III could and some of what the II could do, because it has more memory and a better and faster disk operating system, TRSDOS 6.0, which has more functions than TRSDOS 1.3.

For anybody, whether businessman or student, one of the biggest attractions of the Model 4 is its ability to run programs written under three different operating systems—TRSDOS 1.3, TRSDOS 6.0, and CP/M Plus—which makes more programs available for the Model 4 than for any other Radio Shack computer. ☐

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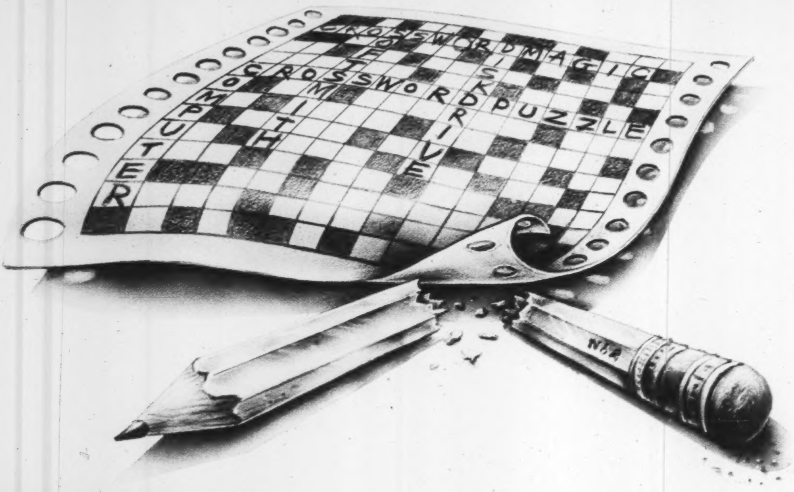

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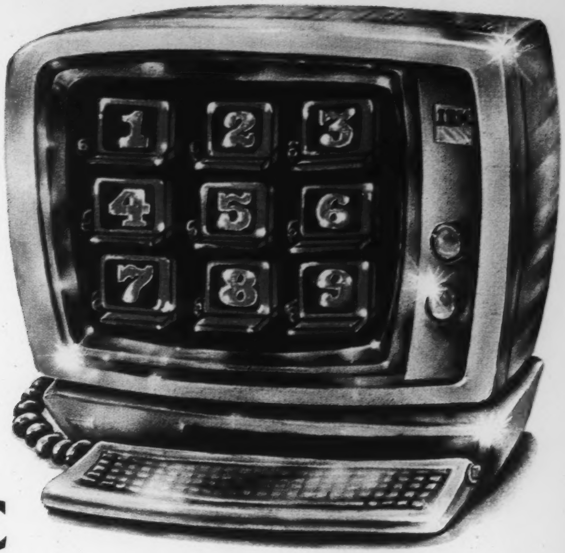

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Smithwriter uses its power to simplify the mechanics of writing. Other programs require multiple keystroke commands for most editing functions. Smithwriter does them with a single stroke. And Smithwriter's simplicity carries over to the instructions, too. They're written in that rarest of all computer languages, plain English.

Don't let the simplicity fool you, though. Smithwriter does things you would expect to find in programs costing at least 3 times as much: automatic centering, super- and subscript printing, underlining, italicizing and double-width spacing. The program is already configured for the most popular printers, so you can start using it right away.

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*Requires 16K expander for VIC-20. Available on disk or cassette for both the Commodore 64 and VIC-20.

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The TRS-80 MC-10

Too little, too late for too much?

Owen Linzmayer

Not inclined to let the TRS-80 Color Computer fade into obscurity, the executives at Tandy have introduced the Micro Color Computer; better known as the MC-10. This new machine functions like a stripped down Color Computer, but looks like a slightly enlarged Timex Sinclair 1000.

The MC-10 is appropriately called the Micro Color Computer. Measuring a petite 2" x 7" x 8.5", the MC-10 takes up very little table space. It is so small in fact, that it is almost dwarfed by the CCR-81 Radio Shack tape recorder it uses as a storage device.

When we look at new computers such as the Timex Sinclair 2000, TRS-80 Model 100, and the TI CC-40, it becomes obvious that computer designers are infatuated with the idea that smaller is better—or at least cuter. The size of the MC-10 supports this theory.

If not for the white plastic case, the MC-10 might very well be mistaken for a Sinclair ZX81 with an improved keyboard. The Micro Color Computer has a 48-key "Chiclet"-style keyboard with almost every key having a normal, shifted, and control value. Using the control key, you can enter entire Basic keywords with only two keystrokes. This is helpful since the keys themselves are so close together that it is virtually impossible to touch type on the MC-10.

Another unfortunate feature of the keyboard is the lack of a shift key on the lefthand side of the keyboard. The control key is positioned right where you expect the second shift key to be located. It is extremely annoying to get the control keyword when you wanted the shifted character instead.

I must say, though, that the MC-10 has a much more responsive and reliable keyboard than that of the Mattel Aquarius

creative computing

HARDWARE PROFILE

Product: TRS-80 Micro Color Computer MC-10

Type: Personal

CPU: 6803

RAM (min/max): 4K/20K

ROM: 8K

Type of keyboard: 47-key "Chiclet"-style

Text resolution: 32 x 16

Graphics resolution: 64 x 32

Number of colors: 8

Sound capability: Yes

Ports: 1500-baud cassette and RS-232C serial I/O

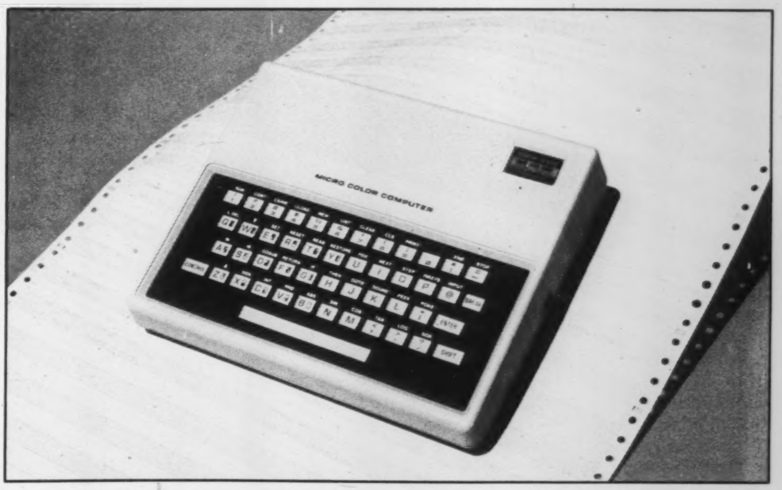
Dimensions (HxWxD): 2"x8.5"x7"

Documentation: 134-page manual and reference cards.

Summary: Will need more than luck to make it.

Price: $119.95

Manufacturer:
Radio Shack - Tandy Corp.
Fort Worth, TX 76102



computer of which I was very critical. (Mattel has since introduced the Aquarius II; the same machine with a full-stroke keyboard.)

Rearview

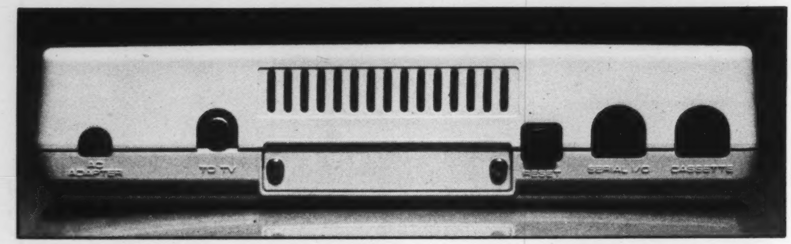
Looking at the back of the MC-10, the first port on the right is a 5-pin DIN connecter for cassette interface. The Micro Color Computer uses the same cables and cords as all of the other TRS-80 computers, thus making the most of the accessories including the tape recorder, compatible. Unlike other Radio Shack computers, the MC-10 does not turn off the cassette motor when not loading or saving.

The MC-10 has a cassette baud rate of 1500; the same as the Color Computer. This might lead you to believe that you can transfer programs back and forth between the two machines—well you can, and you can't. Although you can load the same Basic program on both computers, each interprets the keywords, functions, and commands differently because of the tokens used. This means that except for the line numbers and variable names, the Basic programs are completely changed. See Figure 1 for an example of this.

If I were a knowledgeable machine-language programmer, I would immediately write a transfer utility to rectify this problem by converting the token values. I sincerely hope that Tandy will supply such a program, but I am not optimistic.

To the left of the cassette socket is the RS-232C serial I/O port. Using a 4-pin DIN to male DB-25 cable, you can connect the MC-10 directly to a modem, printer, or another computer that has serial communication capabilities. Adjacent to the serial I/O port is a large red reset button. If the MC-10 ever "hangs up" while in operation, pressing the reset button usually returns control to the user without violating memory.

Centrally located on the rear of the computer is a 34-pin edge connector that is hidden from view behind a removable metal cover. This connector is the expansion port of the MC-10, and as far as we are told, the 16K RAM memory module is the only thing that plugs in here. It might also be used as a program cartridge slot, but Radio Shack refuses to elaborate on this.



Rear of MC-10 showing (l-r) AC adapter, video out, reset button, serial I/O, and cassette port.

Also found on the back of the unit are the RCA video out connector and the AC power adapter plug. The MC-10 outputs its video signal to television channels 3 or 4. The channel select switch is located on the bottom of the computer. The power for the MC-10 does not come directly from a wall socket; it must first pass through an AC adapter which is included in the computer package. The MC-10 uses a non-standard transformer—120V in, 8V out at 1.5A.

The power is turned on and off with a sliding switch found on the righthand side of the computer. Unfortunately, there is no power indicator anywhere on the unit. This is one of the shortcomings of the original Color Computer that has somehow survived the evolution process.

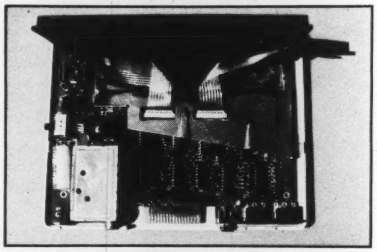
The Insides

Advertised as "the perfect choice for computer beginners," the MC-10 costs $119.95 and comes with 4K of user RAM. While this may be a sufficient amount of memory for a novice, if you want to write larger programs, a 16K RAM module costs an additional $50.

With the plug-in module installed, the MC-10 realizes its maximum—20K of user RAM. If 20K doesn't seem like much in a world of new machines starting with 64K, that is because it is not. A comparable system, the long awaited Timex Sinclair 2000 computer, is capable of high-resolution color graphics and comes with 40K RAM. The Timex is supposed to be expandable to 72K and will initially cost around $150.

ABS
ASC
CHR$
CLEAR
CLOAD
CLOADM
CLOAD*
CLS
CONT
COS
CSAVE
CSAVE*
DATA
DIM
END
EXEC
EXP
FOR/NEXT
GOSUB
GOTO
IF/THEN
INKEY$
INPUT
INT
LEFT$
LEN
LET
LIST
LLIST
LOG
LPRINT
MEM
MID$
NEW
ON..GOSUB
ON..GOTO
PEEK
POKE
POINT
PRINT
PRINT TAB
PRINT@
READ
REM
RESET
RESTORE
RETURN
RIGHT$
RND
RUN
SET
SGN
SKIPF
SIN
SOUND
STOP
STR$
SQR
TAN
VAL

Figure 2. MicroColor Basic commands, statements, and functions.



Interior view of MC-10.

Figure 1.

```
10 CLS 0
20 FOR J = 0 TO 7
30 T = J * 16
40 FOR D = 0 TO 31
50 X = 134
60 PRINT CHR$(X+T);
70 NEXT D
80 NEXT J
90 END
```

MC-10 sample program.

```
10 RESET 0
20 FOR J [ 0 EXEC 7
30 T [ J STEP 16
40 FOR D [ 0 EXEC 31
50 X [ 134
60 DATA COLOR(XTHENT);
70 END D
80 END J
90 INPUT
```

Same program loaded into Color Computer.

Our benchmark tests prove that using an 8-bit Motorola 6803 microprocessor, the MC-10 performs arithmetic computations in Basic 10% faster than the Color

Computer without sacrificing accuracy. This means either that the MC-10 has less overhead in Basic, or that the 6803 has a faster clock rate than its older brother, the 6809. Both of these chips are from the same 6800 family.

The MC-10 has a text resolution of 16 lines, with up to 32 characters per line. Like the Color Computer, it displays lowercase characters in inverse video. The highest graphics resolution directly accessible through Basic is 64x32 pixels. You can have all eight colors on the screen at the same time, but it is impossible to mix two colors within the same character block. This limits the animation capabilities of this lo-res machine. High-resolution graphics are, however, possible through POKEs and machine language programming. The video display is very crisp and precise with none of the flickering or ghost effects that are so common on other low-end computers.

The MC-10 uses a Basic interpreter written by Microsoft called MicroColor Basic. This version of Basic is very similar to the non-Extended Color Basic found on the Color Computer. See Chart 2 for a list of the MicroColor Basic commands, statements, and functions. Text oriented programs written for the Color Computer that use less than 4K should convert easily to the MC-10. Unfortunately, because of the cassette problem mentioned earlier, you must key the programs in by hand.

Documentation

The MC-10 comes with a quick reference card in addition to a 133-page "Operation and Language Reference Manual." The manual is easy to read, but does not take enough time to explain thoroughly the Basic commands. It is not written in the "cutesy" manner as are the TRS-80 Model I instruction guides. It should be noted that this manual contains very little technical or hardware material. If you are a serious hacker, you will have to do your own experimentation and exploration.

It is unfortunate that Radio Shack did not introduce the MC-10 during the first few months of 1983, before the computer price battle escalated into a full-scale war. The cut-throat competition between manufacturers has caused drastic drops in computer prices. You can buy a ZX81 for under $50, an Atari 400 for less than $100, and a TI 99/4A for about the same amount. All of these machines are on their way out, but they still represent tremendous values in today's market.

I do not understand how Tandy expects to sell many Micro Color Computers for $119 when more powerful machines with established software bases are retailing for much less. I wish the MC-10 luck, but I have a feeling it needs much more than luck to make it. ☐

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Programs available on Apple II or IIe, TRS-80, Commodore 64, PET, Atari 800. When ordering, please specify computer model and diskette or cassette format. Sorry, no cassettes for Apple.

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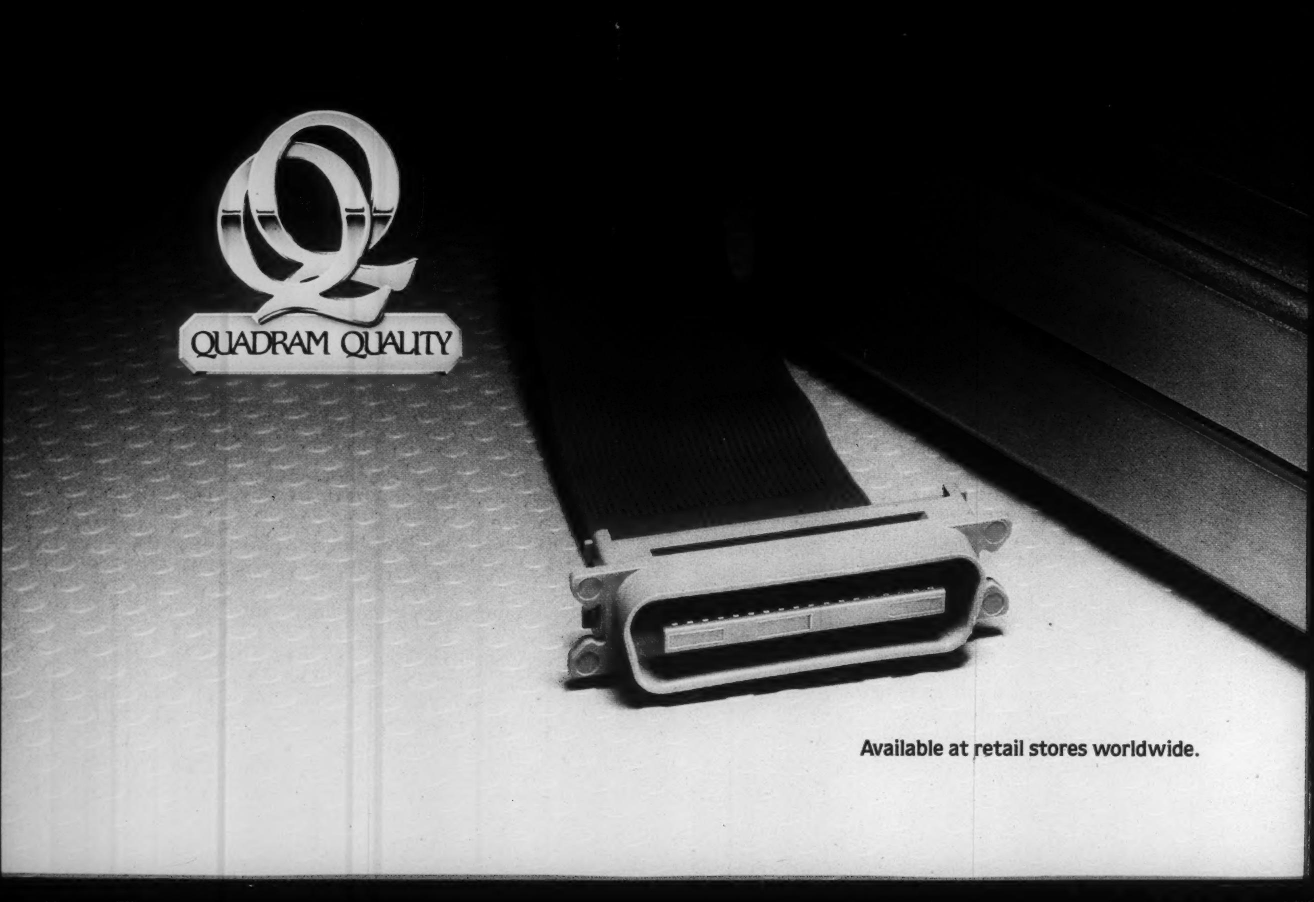

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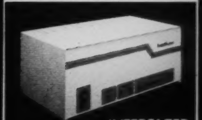

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Centurion Educational Computers

David H. Ahl

When is a computer not a computer? When it is a Centurion Digitor, Versator, or Alphator. While these devices are called computers, and presumably have microprocessors inside, they cannot be programmed in Basic and function solely as educational drill and practice devices. In this role, they do an exceedingly good job.

Centurion manufactures ten different computers in all, four for mathematics, five for language skills, and one for generalized drill in any subject area. We took a close look at Skillmaster, the top of the line mathematics device, and Versator, the generalized drill device. Most of our observations and conclusions will apply to all ten devices.

Skillmaster

To begin with, Skillmaster doesn't look like a computer. It is 8" in diameter, made of white plastic, and shaped a bit like a partially hollowed-out cantaloupe with keys. The keys are like those on a desk calculator (0 to 9, four arithmetic functions, and five keys for programming the unit). In addition, it has two slide switches over the keypad. A green LED display shows up to eight ¼" high numbers or symbols.

When Skillmaster is turned on (the power switch is in the rear), a short "program" must be entered before it will do anything. This consists of pressing R (reset machine), P (to start program), one of four mode keys (sequential, standard, semi-automatic, or automatic), an arithmetic operation or mixed operations key, and G (to go). Semi-automatic and automatic mode also require the desired response time (1 to 9 seconds) allowed to answer each problem to be entered.

Prior to entering this program, the two slide switches should have been set. You set the grade level (0-3, 4-6, 7-9, or 0-9), while the other selects the number of problems to be presented (10, 25, 50, or 100).

These initial operations should probably be performed by a teacher or parent. From here on, it is all in the hands of the child.

The display shows a problem and the child must enter the answer. If it is correct, a smiling LED face blinks to the right of the completed program. In standard, sequential, or semi-automatic mode, the child must then press the

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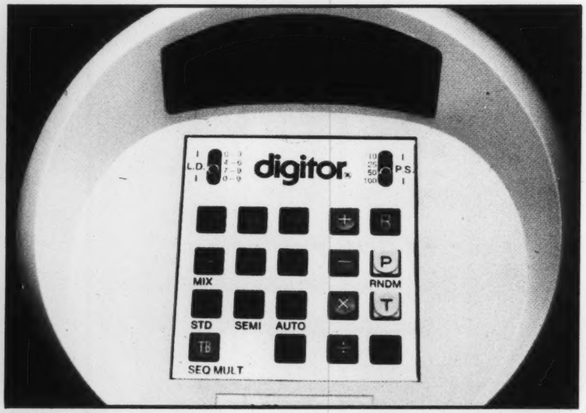


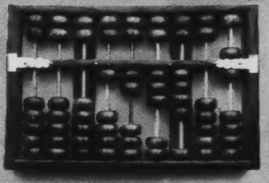
Digitor has green LED characters, ten number keys, nine "programming" keys, and two switches.

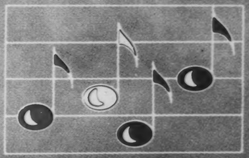
It writes, rates, creates, even telecommunicates. Costs less, does more- the Commodore 64.

When Commodore introduced the 64, the industry suddenly realized that there would be a computer in every home, school and business years before anyone ever dreamed.

That's because Commodore 64 halved the price of high technology: while you can compare the 64's capabilities with those of any sophisticated business PC, you can compare its price with that of an average television.

What can you do with it? Create with its high resolution Sprite Graphics. Add a printer and type with it. Add a disk drive to use spread sheets and other financial programs. Learn and play music through your home sound system on the 64's professional quality music synthesizer.





Add a modem, and hook up with the vast computer networks through your telephone. In short, the Commodore 64 is the ultimate personal computer, at a price you can afford.

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ADORE
MY 64

CIRCLE 122 ON READER SERVICE CARD

COMMODORE 64

commodore 64
POWER

green G button to go to the next problem. In automatic mode, the next problem is presented as soon as the selected response time has elapsed, although in all cases a problem must be answered correctly before the machine will go on to the next one.

Indeed, Skillmaster will never display the wrong answer. If the problem is 3 + 2 and the child enters 4, Skillmaster will display 5 with a frowning face. When the child enters 5, the face changes to a smile. According to the instruction booklet, "Seeing the right answer gives you a chance to learn and eliminates wasteful guesswork."

At the end of a set of problems, Skillmaster displays the total number of problems that were correct on the first try. In addition, pressing the T key displays the elapsed time taken to complete the problem set.

We found Skillmaster to be quite motivational, at least as far as anything to do with arithmetic drill and practice, which most kids regard as pretty dull, can be. As far as the timed response modes, kids found the semi-automatic mode less confusing than the fully automatic mode.

A slight limitation to Skillmaster is that all problems must be in the form:

XX operation X = XX

Thus 11+7 is okay, but not 7+11. Also, no answer can be over two digits. Actually, these points are moot, since the largest addition problem in the machine is 9+9; the largest subtraction problem, 18-9; multiplication, 9×9; and division, 81/9.

An excellent aspect of the Digitor products is the outstanding instruction booklet and optional ancillary material. The included 32-page "Learning Guide" contains complete instructions on how to use the machine, learning objectives, rationale of the design, and 16 reproducible masters of activities which complement the use of the machine. Complete instructions are provided for the use of each activity in conjunction with the machine.

Available at extra cost are grade level packets which include appropriate management materials. These include a 16-page management guide, set of 12 pre/post tests with answer keys, class profile folder, individual student progress form, five individual student completion records, a student scheduling wall chart, and a student progress wall chart. All the individual materials are in the form of reproducible masters.

Skillmaster will never display the wrong answer.

The products in the Digitor series are:

- Drillmaster (10 random mixed problems, grades 5+) $139.50
- Superdrill (25 random mixed problems with timing, Grades 5+) $159.50
- Tutor (programmable with timing, grades K-4) $179.50
- Skillmaster (programmable with timing, grades K-9) $199.50
- Grade level packets, $8.70 to $13.25 each.

Versator

Versator is a device for presenting a wide variety of educational exercises. The majority are variations on the drill and practice theme, but some go a bit beyond it.

Outwardly, Versator is similar to Digitor except that it has a cartridge slot in the top, and the keyboard is perfectly blank. Upon turning on the power, the 14-character, green, dot matrix display lights up with "hello" and a smiling face at the right. Pressing any part of the flat keyboard membrane causes Versator to display "insert module."

Mastery Learning Modules are the solid state programs for Versator. Without one of these $59.50 modules, the machine can do nothing. Each module comes in a vinyl booklet that contains a four-page Learning Guide, a keyboard overlay, and a plug-in module. When the module is inserted, Versator reads, "apply keyboard."

You then use the top five pressure-sensitive spots to program Versator. This starts with the operating mode. STUDY repeats each problem until it is answered correctly. TEST does not repeat problems. TRANSMIT and RECEIVE allow two Versator units to up- and down-load programs between them.

The SUBJECT key selects from the one or two subjects on a module and LESSON selects a set of problems within the subject.

Response Mode can be standard (self-paced), semi-automatic (timed response but user presses Go for additional problems), automatic (timed responses and problem presentation), manual (used with word lists), and tachistoscopic (words presented in "flash" form for 1/60th to 3 second intervals).

The Problem Set key allows you to choose 10, 20, or 30 problems. For those modes requiring a response time (or tach time), it is now specified.

As with Digitor, it is recommended that a parent or teacher help out entering the above steps.

There are currently over 50 mastery modules available. The majority are in the areas of reading, language arts, and spelling, although nine are available in mathematics and four in science. We

versator
mastery learning module
LEARNING GUIDE
versator.
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GO
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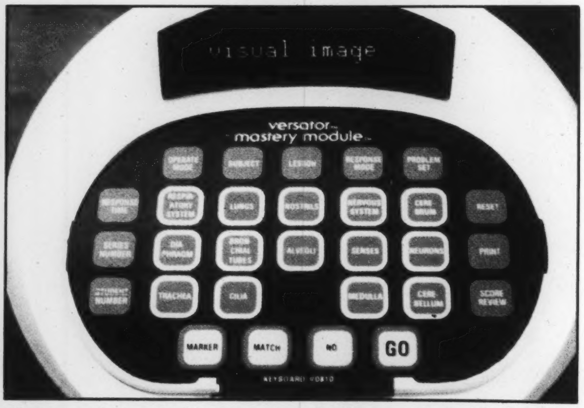
Versator is used in conjunction with "Mastery Learning Modules," each one of which includes a booklet, keyboard overlay, module, and vinyl binder.



Versator has a 14-character display and touch-sensitive keyboard.

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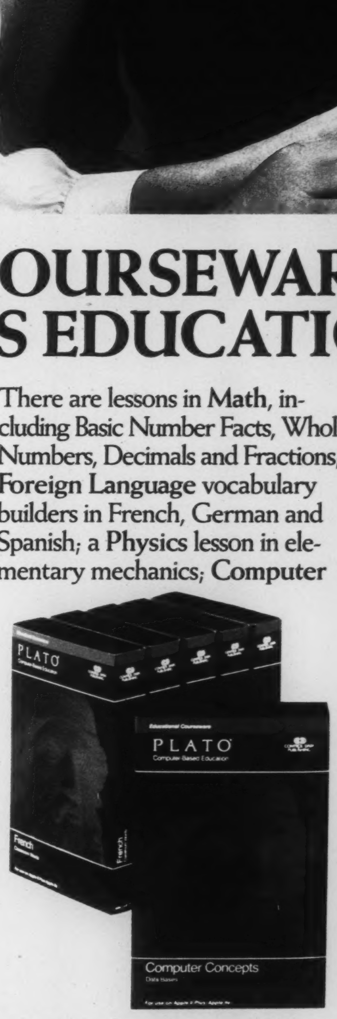

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by Dr. J.C. Gilland
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Centurion Computers, continued...

tried four modules: Identifying Affixes and Compound Words, Spelling Demons and Unscramble, Mixed Math Exercises, and Systems of the Body I. Each of these could be a feature review, so we will have to limit ourselves to some general comments.

All the modules are very thorough and present the material at a controlled step-by-step pace. The learning objectives are clearly stated although we would have liked to see a suggested grade level or range of grades for the module.

The instructions were generally clear although some parts were not as clear as they might have been. This was particularly true with modules that required something to be marked with the underline symbol.

Since the correct answer to most problems requires several keystrokes which must, of course, be executed in the proper order, we found that most users did not like the pressure of the timed modes; they became nervous and flustered. Thus, we recommend the use of the self-paced modes; these keep track of elapsed response time but users seem to feel more relaxed and tend to score higher.

Of the four modules we tried, the science one, "Systems of the Body" was the least satisfactory. It has the most complicated keyboard overlay and the sparse four pages of instructions did not give us enough background to understand the problems fully. The guide mentions several related textbooks, at least one of which is probably necessary for using this module successfully.

Subject to the limitation of presenting word problems in a maximum of 14 letters, Versator is a nice compact learning device. However, at $299.50 plus $59.50 for each module it wouldn't be difficult to spend $1500 or more in short order. Whether or not it is worth that much, you will have to decide for yourself, but it is certainly worth a look.

Other Products

Centurion also produces five Alphator products. Alphamaster presents drill on vowel sounds, consonant blends, compound words, affixes, syllabication, letter matching, and ordering. For grades K-5, Alphamaster costs $359.50. Similar products are Alphatutor I for grades K-3 and Alphatutor II for grades 3-5 ($299.50 each). Alphaspell provides drill in spelling-related skills and costs $359.50 while Alphadrill provides continuing development of vocabulary skills in the upper elementary grades ($319.50).

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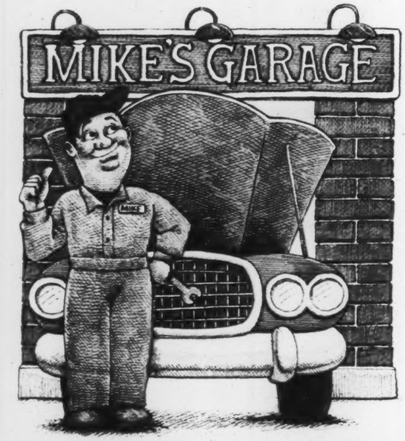

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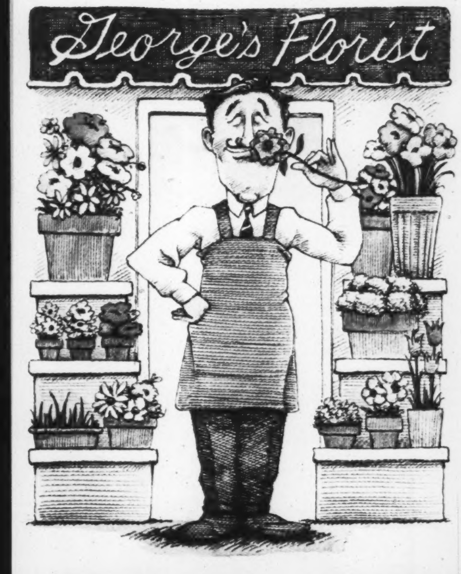
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CIRCLE 213 ON READER SERVICE CARD

creative computing equipment evaluation

The Legend of the Pad of Power

Joe Devlin

Once upon a time, around 1982 to be precise, four magical people met in a faraway land known as Georgia. They looked into their crystal balls and determined that the next boom in personal computers would be in the area of educational software for the home. They looked around and saw that, throughout the country, little home learning software of quality and imagination was available. And it came to pass that they created Chalk Board, Inc. for the purpose of rectifying this tragic situation.

The quest for new and novel software proved hard. The more time these magicians spent trying to write enchanting programs, the more frustrated they became with the hardware the software was supposed to run on. To cast their spells on children, to make children want to learn with computers, the Georgians had to communicate with the kids.

Now, children are interesting creatures, very different from you and me. Even children who know the alphabet don't always have the manual dexterity required to use a computer keyboard. They don't understand bar code readers very well. And, although kids can learn to use light pens and screen-oriented menus, parents are often uneasy when their children stand for hours in front of color televisions and poke at the screens with sharp objects.

The magicians pored over their books of spells and almost emptied their bags of tricks. What they wanted was an input device that was flexible, sturdy, easy to use, inexpensive, and portable. It should be large enough to sit on a child's lap and sturdy enough to take childish abuse. It should be portable enough for a child to carry around, and it should have a cable long enough to allow the child to use the device while sitting on a couch or on the floor near the TV. They concluded that if they wanted a piece of hardware to fit their needs, they would have to conjure it up themselves.

Add graphics software and PowerPad becomes a graphics tablet.

Thus, Chalk Board, a company founded to produce software, ended up creating hardware to meet its software goals. Because the device they created is a pad of great power, they named it PowerPad. Its power is such that children and adults alike will soon be found curled up on couches throughout the land entranced by its spell. Its utility is such that many programs are being written to make use of the magic it wields.

The Magic Begins With The Hardware

The magic of PowerPad is that it is a tabula rasa. Thus, it can be set up as the input device for an infinite variety of software. With a change of software and a flip of a plastic overlay, PowerPad can go from being a graphics pad to being a piano keyboard.

The pad retails for $99.95. For this you get the large (17" by 20") off-white pad complete with a big slot of a carrying handle, cabling to hook the contraption up to any Commmodore 64, Vic-20, or Atari computer, and a user's manual.

The software required to use the pad must be purchased separately. The cabling that comes with PowerPad will not work with the IBM PC or with the Apple II. Hooking the PowerPad up to an Apple or an IBM computer requires the additional purchase of a $49.95 starter kit. This kit includes both the software and cables required by these two computers.

At the heart of the pad is a touch sensitive membrane invented by some of the Chalk Board people. This membrane lies in the 12" by 12" working area in the

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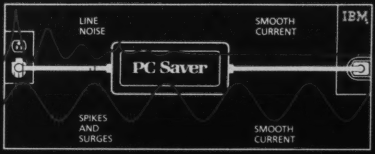

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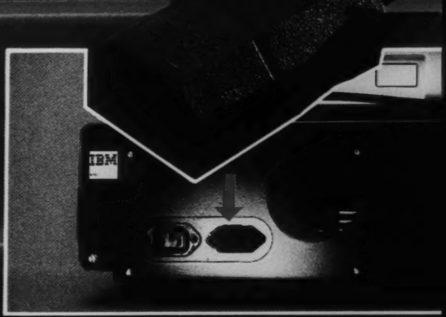

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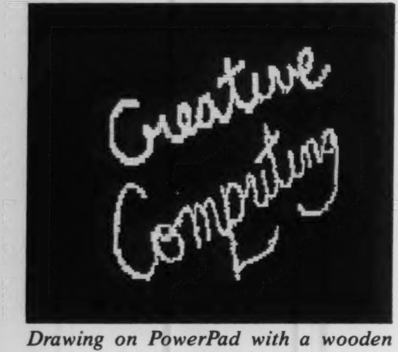
middle of the pad. Along any horizontal or vertical line there are 120 switches. The resulting 100 switches per square inch give the PowerPad the highest resolution of any touch-sensitive device I have seen.

One of the most unusual features of the PowerPad is its ability to respond to more than one point of contact at a time. Most touch-sensitive input devices can register contact with only one point at a time. PowerPad can determine that it is being touched in several places at once through the use of the 14,400 digital switches beneath the surface. As a result, you can press your whole hand down on PowerPad and produce an image of the hand on the computer screen.



Drawing on PowerPad with a wooden stylus produces detailed images.

By itself, the hardware is just another example of a nice graphics tablet in a market that is rapidly becoming crowded with such devices. But there is more. Chalk Board is also producing a library of software and removable membrane overlays that completes the process, turning the product into something that dazzles.

By redefining the pad as a keyboard for particular applications and by producing individual overlays that guide the user through the use of this new keyboard, relatively complex things can be done easily. The size, location, and function of each key is determined by the software designer. The programmer is not stifled by the fixed spacing of a normal keyboard.

Each overlay can be imprinted with a distinct arrangement of color coded areas that serve as both menu and function keys. Pressing one of the mylar squares activates the function controlled by the software and indicated by the markings on the plastic overlay.

As software and mylar overlays are changed, the PowerPad can become in turn a keyboard arranged alphabetically so as not to confuse children, or a keyboard with extra large keys for those whose eyes have dimmed. Musicians can have a piano keyboard, with every key functional. The multiple registration feature allows musical chords to be played on the PowerPad instead of the single notes possible on most graphics tablets.

Software Weaves Its Spells

The Chalk Board software, dubbed Leonardo's Library, will eventually include more than 30 software packages, spanning six subject areas (visual arts, music, mathematics, science, language arts, and social studies) and five levels of difficulty. Not all the software available for PowerPad will come from Chalk Board. Other firms are currently converting software for the PowerPad or writing new software that makes full use of the capabilities of the product.

creative computing

HARDWARE PROFILE

Product: PowerPad

Type: Graphics input device

System: Atari, Commodore 64, Vic-20, Apple, IBM

Format: 12" by 12" graphics tablet

Specifications: 4.5 lb. graphics tablet with a 12" by 12" working area. 100 points per square inch resolution. Tablet can respond simultaneously to several points at once.

Ease of Use: Good

Documentation: Mylar overlays are packaged with all software to guide the user. Manuals packaged with PowerPad and all allied software are well written. $99.95 for Commodore 64, Vic-20 and Atari computers. $149.90 for IBM and Apple computers.

Overall Mark: Excellent

Manufacturer:
Chalk Board, Inc.
3772 Pleasantdale Rd.
Suite 140
Atlanta, GA 30340

Summary: A flexible input device with a few limitations.

Chalk Board plans to make each software package they offer available for the Commodore 64, Vic-20, Atari, IBM-PC, and Apple II computers. Obviously, because of profound differences between the capabilities of these machines, the power of the software will reflect the strengths and limitations of the machine it is written for. Software for the Commodore and Atari computers will be in cassette format. IBM and Apple computers will make use of disk-based software.

Each software package will include a tough plastic overlay that is imprinted with function buttons and a manual describing several learning activities. Prices for software will range from $24.95 to $49.95. There will be at least three software packages available initially.

Finger "painting" is also possible — and any image is easily duplicated elsewhere on the screen.

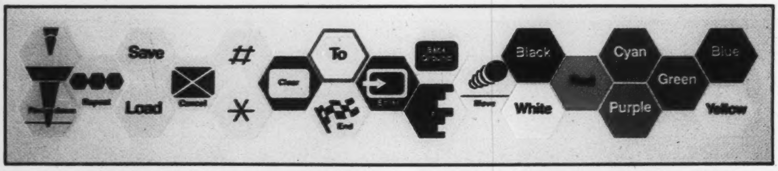
The *MicroMaestro* is a music package that turns the PowerPad into a fully functional two-octave music keyboard and synthesizer. It will retail for $24.95.

Leo's Logo will retail for $49.95. As its name implies *Leo's Logo* will use the PowerPad to bring the Logo language to the child. The third software package is a graphics tool called *Leo's 'Lectric Paint Brush*.

Leo's 'Lectric Paint Brush

Leo's 'Lectric Paintbrush is a graphics package that retails for $24.95. It is a good example of the kind of software that Chalk Board is planning to release. Getting started is easy. Insert the software cartridge into the back of the computer, plug the PowerPad cable into the computer, snap the mylar overlay into place on the working surface of the PowerPad and *Leo's Paintbrush* is ready to use.

There are 21 symbols printed on the top of the overlay. Most noticeable are the color keys on the top right. There are



Some of the keys printed on the plastic keyboard that comes with Leo's 'Lectric Paintbrush are easy to understand. Others are more cryptic.

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Power Pad, continued...

eight labeled colors—black, white, red, cyan, purple, green, blue, and yellow. Touch any of the color keys and a musical note emanates from the TV speaker letting you know that you have chosen a color. Touch the keyboard with your finger and a spot of colored light appears on the screen. Slide that same finger across the surface of the pad and a line appears on the screen.

You are free to draw with one finger or many. The pad responds best to slow, even motions. One of the limitations of the program is that it uses only eight colors, in spite of the fact that some of the computers it will run on have more colors available.

If the line produced by your finger is too broad you can use a blunt stylus to get a finer edge. The finest line I was able to achieve on a Commodore 64 was about the width of a matchstick. Using the PowerPad with the IBM PC or another computer with better resolution should produce better results.

Many of the other keys on the mylar membrane are as self explanatory as the color keys. For example, hitting the Background key followed by a color key will change the background color. The Pen Up and Pen Down keys are used to indicate which points are being pressed on the membrane. Hit Pen Up, and a tiny ink-filled pen appears on the screen letting you know where you will begin drawing when you hit Pen Down. If you touch more than one spot at the same time, the pen will jump from spot to spot on the screen indicating all the various points of contact.

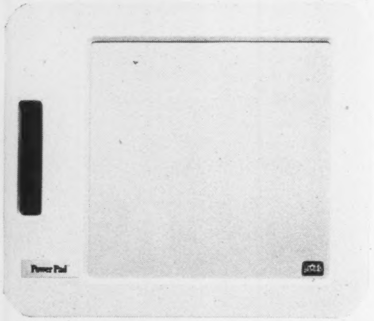
Press Pen Down and you activate the paint brush; the little pen point disappears and in its place a small dot appears. You are now in drawing mode.

The Fill key is used to fill in solid objects on the screen. Again, its operation is logical. Position the pen on the space you want to fill, hit the Fill key followed by the color you want to fill it with. Voila! The object fills with color. The Fill key will fill any closed-in space. If there is a hole, even a miniscule one in the object, the color will leak out of the object, like water from a broken vessel, filling not only the object but the rest of the screen as well. If this happens, hit the Cancel key to stop the overflow of color, and you can resume your artwork.

The functions of some of the other keys are less apparent than those of the color keys. For example, Asterisk and Hashmark keys serve as general function keys to do such things as calling forth the memory grid. The functions of two keys labeled To and End may also be a puzzle to the uninitiated. The fact that the End key is emblazoned with a flag did not help to clarify matters for me.

These two functions have been borrowed from the Logo programming language. The To and End keys are used to indicate the starting and ending points of the definition of an object. Once an object has been defined, it can be moved about or copied to other parts of the screen. To start the operation, first hit the To key. Next draw the object—say, a red circle. Hitting the End key tells the computer you have finished drawing the circle.

> ***The PowerPad is a flexible input device that will stimulate the imaginations of programmers.***



Defining objects uses up a great deal of computer memory. To find out how much space you have left, you can call a bar graph onto the screen to indicate the amount of memory space left by hitting the asterisk key.

The number of objects that can be saved depends on the computer with which the PowerPad is used. For example, up to nine objects can be defined within the memory of a Commodore 64. Hitting the Clear and Asterisk keys together undefines all objects, thus freeing memory and giving you space to define new objects. The screen does not change when this is done. The red circle remains on the screen. Undefined objects do not disappear but they cannot be moved or duplicated again.

Once objects have been defined you can do several things to them. Any object that has been defined can be repeated anythwere on the screen or moved from its original location to a new location simply by hitting the Repeat or Move key, touching the object you wish to move, and then touching the spot to which you want it to go.

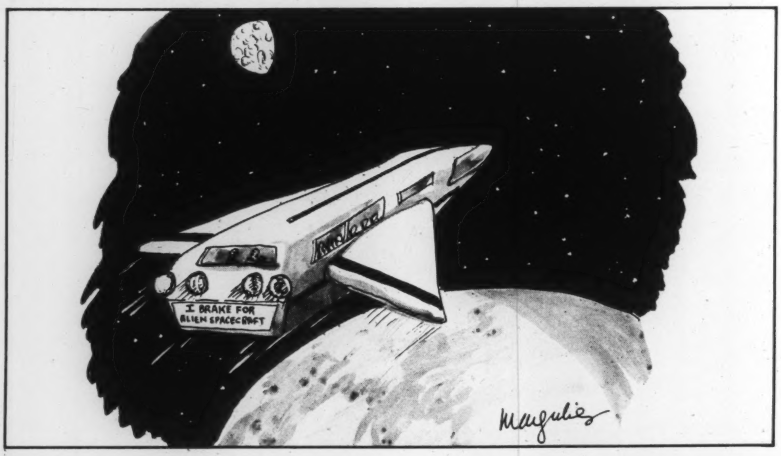
Objects can be saved on disk or cassette. Since there are no alphanumeric keys on the membrane, the objects are named by using the color function keys. Thus, you could name one object "black-green-red" and another "blue-yellow."

Limitations

The PowerPad is a flexible input device that will stimulate the imaginations of programmers—even those who don't come from the mystical land of Georgia. The product does have a few limitations, however. A flat membrane keyboard cannot provide as much comfort or tactile feedback as a full stroke keyboard would provide for an adult.

Although the PowerPad case is quite sturdy, the mylar overlay is more fragile. Sooner or later someone is bound to cast his spell with a ballpoint pen or scissor point. The wise folks at Chalk Board have forseen this problem and are making overlay replacements available for $6.00.

In short, the people at Chalk Board seem to know what they are doing. And so the wizards from Georgia presided over a happy marriage of hardware and software. And they lived happily ever after. The end. ☐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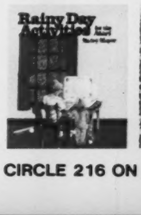

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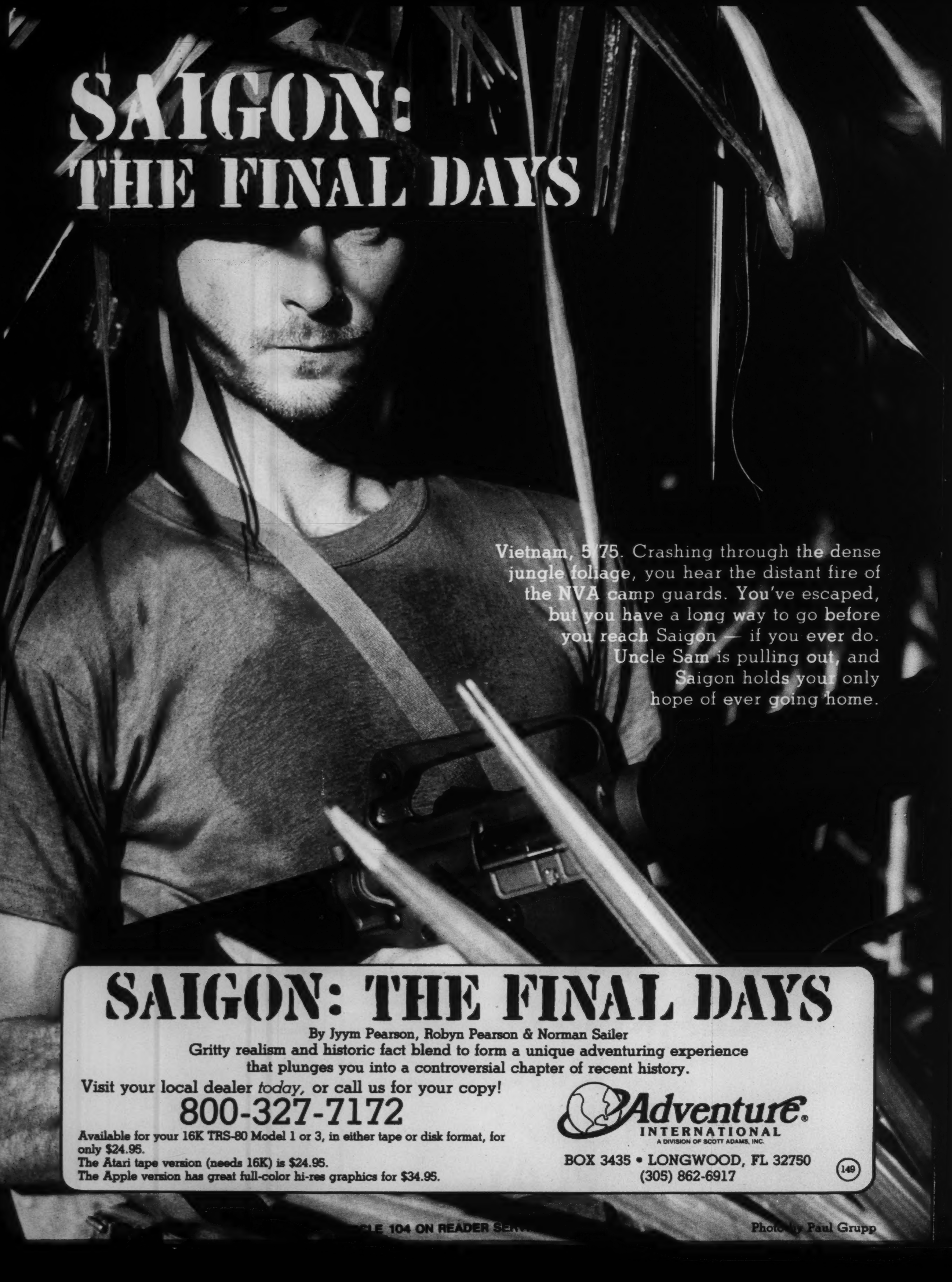

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Houston Instrument HiPlot DMP-29 Plotter

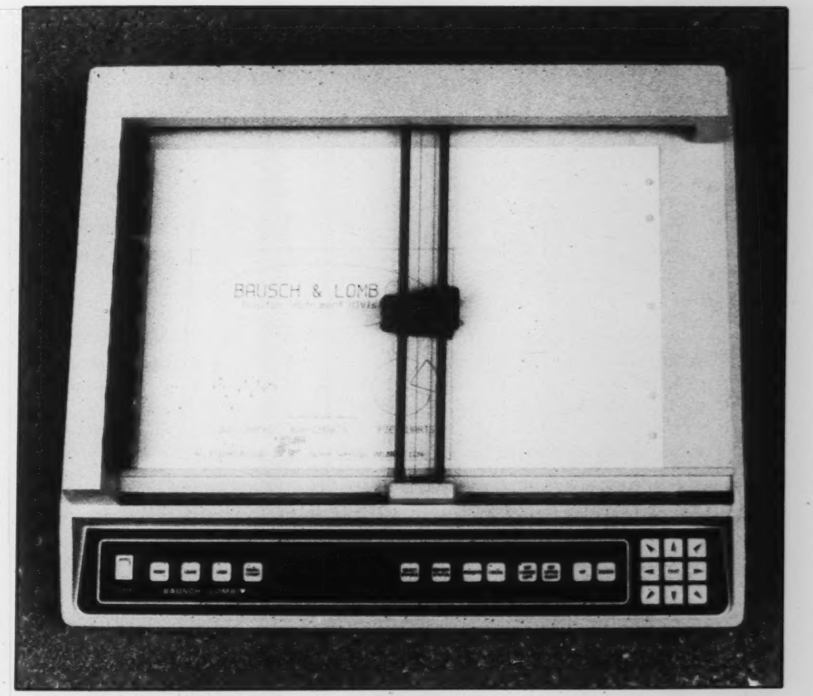
David H. Ahl

In most cases, the lead-in to a review leaps to assert itself. In some cases the product has one or more outstanding characteristics that beg to be mentioned; in others, the company is strange or unusual; in still others, the reviewer has some biases that just must be put on the table.

In the case of this review, all are operative. Here are three possible lead-ins:

- Houston Instrument is an inward-looking company. They have spent nary a dime on advertising with *Creative Computing* even though plotters are high on the list of peripherals that many readers wish to purchase. They rarely send out a press release; and when they do, it is certainly not to us. We always make a point to stop by their booth at NCC, but we are usually made to feel like dolts by the engineers at the booth who speak an obsure dialect of English called Plotter-Speak.

Plotters represent a vast, untapped resource for artistic expression.

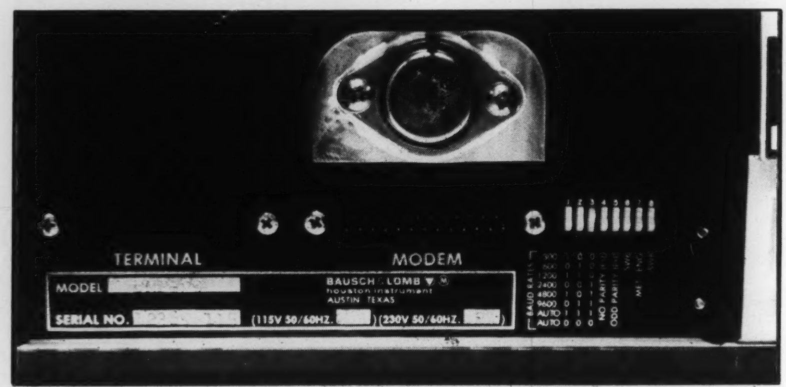


DMP-29 Plotter measures 22" × 19" and produces plots on sheets up to 11" × 17".

- For many years, Houston Instrument has been making a line of plotters know as HiPlot. They have gone their merry way, designing one innovation after another into their plotters, until today, the DMP-29, little-known and little-heralded, is one of the most advanced, user-friendly, and cost-effective plotters on the market.
- In the early 70's, I worked for Digital Equipment Corporation as manager of the Educational Products Group. To help users of computers in educational institutions, I wrote a series of booklets called Basic Applications Programs—(Subject). One was on plotting. It described how to use two plotters, the TSP and Fasplot, with PDP-8 Basic.

Among other things, I wrote a simulator in Basic which would make the plotter execute the turtle graphics portion of a virtually unknown (at the time) language called Logo. When Logo became more widely known, I asked some of my friends at DEC about my simulation routines. Alas, they had gone the way of other blue sky projects and had long since been forgotten and tossed out.

It was just as well. I was up to my eyeballs in other things and could ill afford to get hooked on plotters again as I once had been. Nevertheless, I still have a fond place in my psyche for plotter graphics. I am appalled at what many people do with plotters. I feel that plotters represent a vast, untapped resource for artistic expression, and should be the computer peripheral of choice after a disk drive.



Plotter has RS-232 ports built in; Centronics and IEEE-488 ports are available as options. Up to 9600 baud can be set with the dip switches.

A Friendly Package

The Houston Instrument DMP-29 plotter is a flat bed plotter; this means that the sheet of paper lies on a flat surface and the pens move in two directions to trace a plot upon this surface. In contrast, on a drum plotter, the paper is wrapped around a drum and the pens move across the paper while the drum rotates to produce a two-dimensional plot.

On the DMP-29, the bed accommodates a piece of paper measuring 11″ × 17″. It is possible, in either hardware or software, to select a half-size plot measuring 8 ½″ × 11″. On a full-size plot, the plotting area is 10″ × 15″ and on a half-size plot, 7″ × 10″. The paper is held in position by a lip on the plotter bed at the bottom and by permanent strips of adhesive tape at the top.

All the manual plotter controls are on a touch sensitive front panel similar to the control panel on a microwave oven or an Atari 400 computer. There are 14 controls arranged in seven groups.

This may sound like a complicated set of controls, but it is really quite straightforward during normal operation. The first group of controls contains the power on/off switch, reset (clears memory and resets the plotter), load (pen moves to a corner to facilitate paper loading), and chart size (toggles back and forth between a small and large chart). For normal plotting, these are the only controls that will ever be used.

"Select enable" lets the plotter respond to computer input. When the plotter is powered up, this is on. LED indicators show the status of this and the remaining controls, as well as five other aspects of the plotter.

Two buttons select either remote or local operation; on power-up, remote operation is the default mode.

The remaining controls are used for local mode and digitizer mode. Two buttons raise and lower the pen, while a nine-button keypad is used to move it manually about the plotting surface.

On the rear of the plotter are two RS-232 connectors, a male marked "Modem," a female marked "Terminal," and a dip switch with eight switches to select communications characteristics.

Connecting to a Computer

The instructions with the plotter suggest that "any standard DB 25-pin flat ribbon cable can be used to connect the serial RS-232C interface to a computer." Maybe so, but this approach did not work on any of the four computers we checked out with the DMP-29. In desperation, we tried a "reverse connection" cable and it worked fine.

The DMP-29 has its own plotting language which is elegant and powerful.

The computer must be connected to the modem port (male) of the plotter. Although the pin-outs have the same description as those on the computer (Pin 2 is transmit data, Pin 3 is receive data, Pin 4 is request to send, Pin 5 is clear to send and so on), the lines must be reversed. In other words, Pin 2 goes to Pin 3 and 3 to 2, Pin 4 goes to 5 and 5 to 4, and Pin 6 goes to 20 and 20 to 6. Pin 1 (protective ground) and Pin 7 (signal ground) are tied together. We made up a cable to provide these exchanges, but such cables are available from suppliers such as Wireworks Corp. (DC9-2, 9-cond male/male, #810937).

With this reversed cable, we were able to run the plotter from a TRS-80 Model III, TRS-80 Model 100, NEC 8201, and Apple II. Presumably, it will work with any computer with a serial RS-232 output port.

The rear panel dip switch may be set to any of six baud rates (300, 600, 1200, 2400, 4800, or 9600), parity (even, odd, or none), and metric or English incremental steps. Data word format is always eight bits with two stop bits.

Typically, the first command in a plotter program written in Basic will be:

```
OPEN xxx FOR OUTPUT AS 1
```

in which xxx is the communications specification. On the NEC 8201, for example, the specification would be "COM:6N82XN". This means 2400 baud (6), no parity (N), eight bits (8), two stop bits (2), and XON enabled (X). The final character, N, does not matter to the plotter. We found 2400 baud to be an ideal operating speed; at slower speeds, the plotter occasionally had to wait for data while at higher speeds, the buffer frequently filled up.

The DMP-29 may be ordered with one of two optional interfaces: Centronics-compatible parallel or IEEE 488 GPIB.

Producing a Plot

At the left side of the plotter bed are eight pen holders. Each one holds a hard-nibbed pen in one of eight colors: black, red, magenta, orange, light green, dark green, blue, and brown. These pens are included with the plotter. Each has a nib protector which must be removed when it is inserted in the holder. Optional fiber tip and drafting pens are available.

The plotter can use almost any type of paper, although a highly-polished paper (or mylar) produces better plots than a porous or rough paper. A wide variety of quadrille, chart, and graph papers are available from Houston Instrument as well as independents such as Dietzgen, K & E, Charrette, and Bienfang. We tried several and got excellent results.

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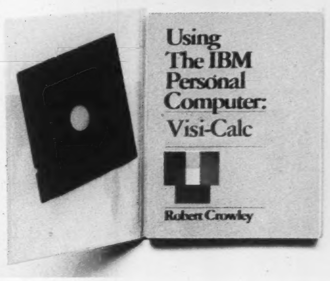
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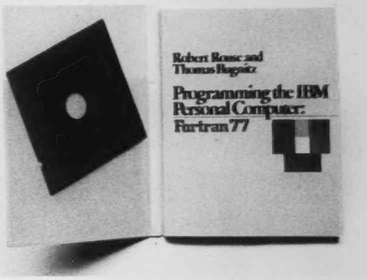
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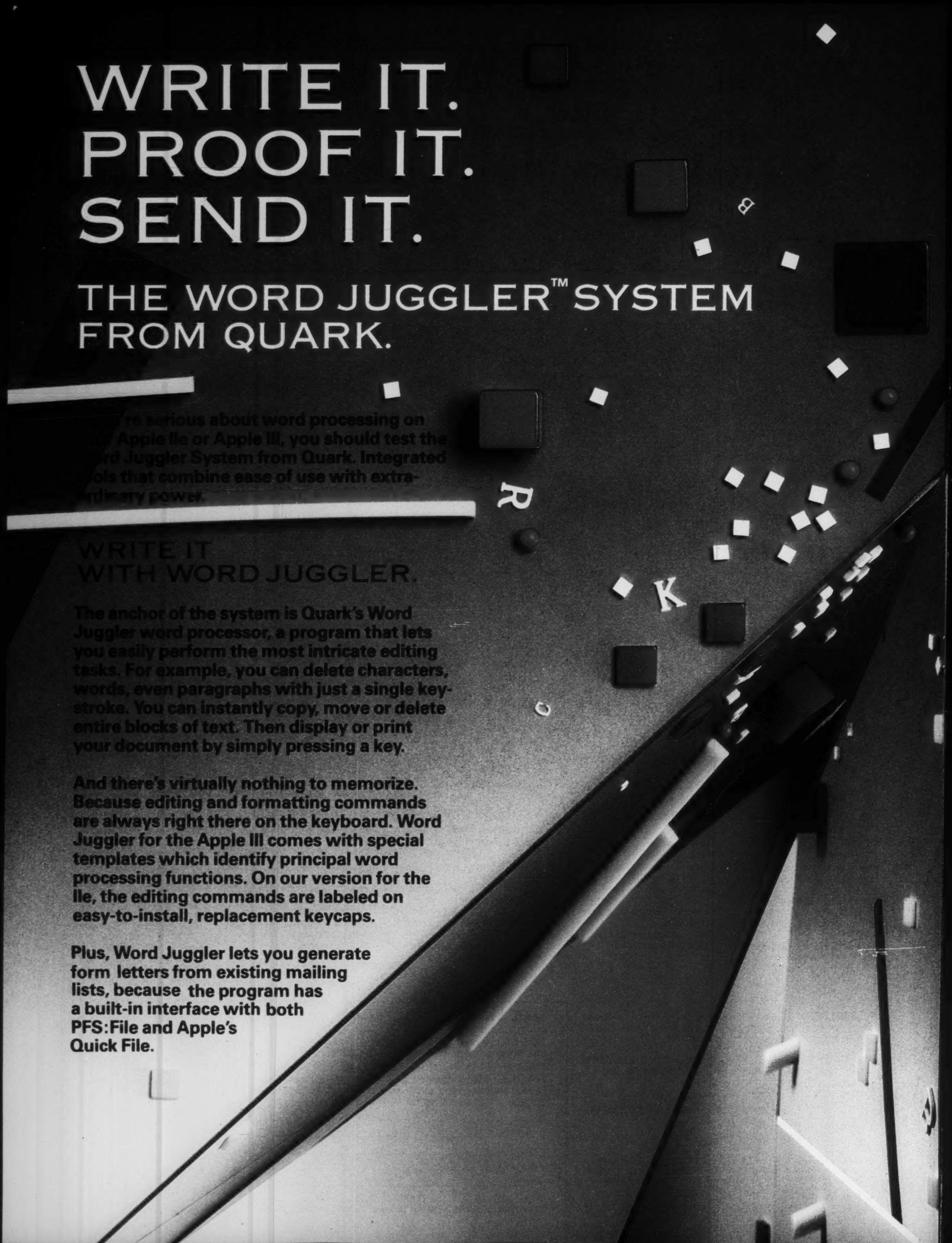

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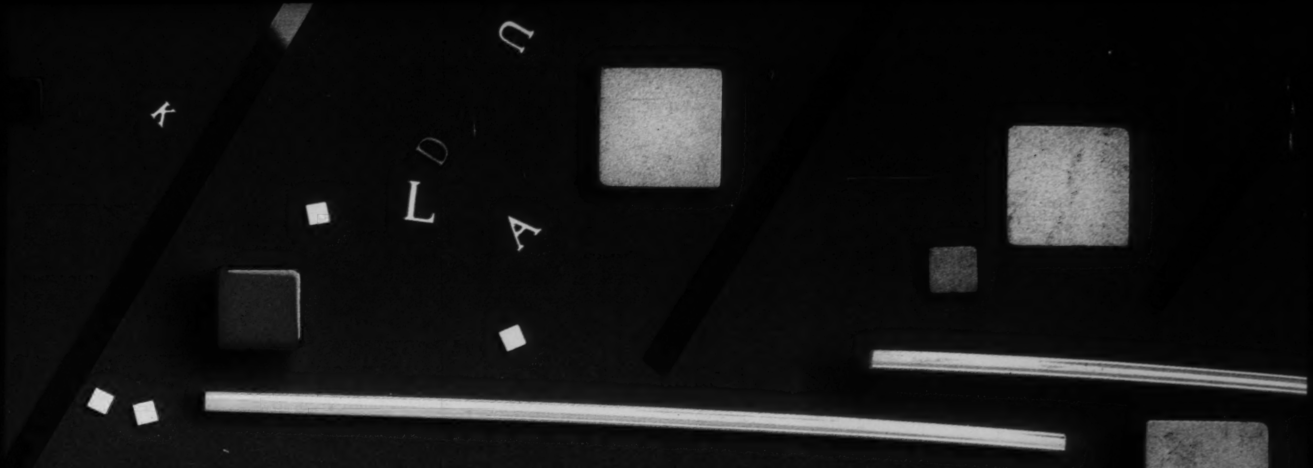

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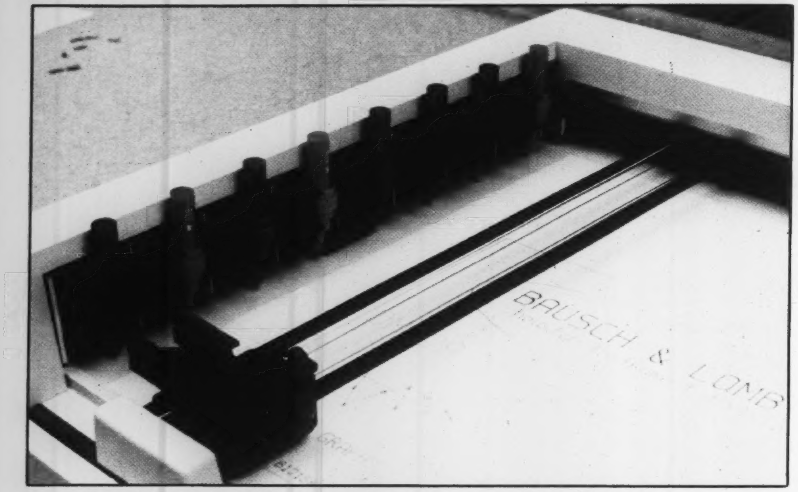


Eight colored pens are held in pen holders at the left of the plotting bed.

The plotter has two operational modes. The first allows the plotter and computer to communicate using the XON/XOFF protocol and requires very little in the way of handshaking. When the buffer is full (512 bytes) the plotter indicates to the computer with a code 13 to stop sending (XOFF). When the buffer is half empty (256 bytes), an XON (Code 11) is sent. This is normally the preferred mode of operation.

Alternatively, Mode two lets you replace the XON/XOFF mode with your own handshaking, delay loops, and user-specified prompt codes. While you theoretically can gain some speed by using Mode two, it is considerably more complicated in programming and recommended only for serious users who want to control everything in sight.

The DMP-29 has its own plotting language which is elegant and powerful. The simple sequence of a semi-colon followed by a colon (;:) activates the plotter. Once the plotter is selected, it responds to everything sent over the communications channel until a deselect (@) or reset (Z) command is sent. Upon receiving the select command (;:), the plotter automatically selects Pen 1 as part of the initialization routine.

If you want a pen other than Pen 1, you simply send Pn, where n is the number of the pen you want. T selects the self-test routine. This tests the logic circuits of the plotter and causes it to draw the self-test plot which uses all the pens and all the functions. The self-test can also be selected manually.

Pen up is selected by U and pen down by D. An H causes the plotter to go to the home position (0,0) in the lower left-hand corner of the paper. The command O causes the plotter to specify the current pen location as the origin of your plotting system.

The plotter normally assumes a full-size plot; half-size is specified by the command EF. If you have specified half-size and want to get back to full-size plots, the command EH will do it. These commands override any that have been set manually on the plotter front panel.

The plotter normally draws continuous lines. However, if you want any of nine varieties of dotted line, they can be specified by the command Ln (n=1 to 9).

The pen may be positioned with respect to an absolute set of coordinates (A) or relative to the last point plotted (R).

To draw a line, you simply specify the x and y coordinates of the start point and end point that you want drawn. For example,

```
; : HAD 0 , 600 600 , 600 600 , 0 0 , 0U
```

will cause the plotter to be selected, go to the home position, specify absolute positioning mode, lower the pen, and then draw a square of 600 units on a side.

To draw the same square using relative positioning would require the following:

```
; : HRD 0 , 600 600 , 0 0 , -600
- 600 , 0 U
```

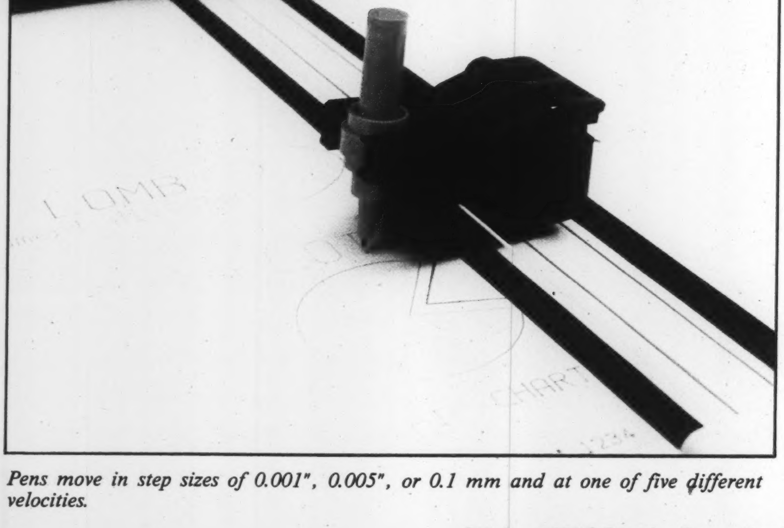
In a sense, relative positioning is very similar to the turtle geometry commands in Logo although, of course, angular measures are not implemented.

In the absence of any specifications, the plotter uses step sizes of 0.005 inches (200 steps per inch). In other words, a full size (10" × 15") plot with 0,0 at the bottom left corner would have a maximum x value of 3000 (15" × 200 steps) and a maximum y value of 2000 (10" × 200). Step size may be changed with the command ECn in which n is 1 for 0.001", 5 for 0.005", and M for 0.1 mm (metric).

For some plots it may be desirable to specify the velocity of pen movement. In the absence of this command, the pen moves at two inches per second. However, it may be specified at 1, 2, 4, 8, or 16 inches per second (or one of five metric speeds).

Windows, Functions, and Symbols

An amazing feature of the DMP-29 is



Pens move in step sizes of 0.001", 0.005", or 0.1 mm and at one of five different velocities.

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called the Window. This is defined as an area of a plot that you wish to reproduce or scale. A single command specifies the upper left and lower right limits of a window. Whatever plot data are in this area will then be reproduced in another area called the Viewport, also defined by the upper left and lower right limits.

Moreover, if the Viewport is a different size or shape from the Window, the plot will be automatically scaled to fit. Thus, if you have a plot of a circle with a square Window around it, and you specify a large rectangular Viewport, the new plot will become a large ellipse. This pair of commands opens up a world of possibilities.

Anyone who has used a plotter is familiar with the equations for a circle, ellipse, and arc, and probably has a favorite curve-fitting method, since these plotting techniques are so frequently needed. However, all are built into the software of the DMP-29. A circle is plotted with the command CC x,y r, where x and y specify the center of the circle (which may be off the plotting surface) and r specifies the radius. The commands to produce an ellipse and arc are similar.

The DMP-29 can be used as a digitizer input tablet.

The general curve plot requires you to specify only the high and low points of a curve, although the plotter will not object to more points being specified. The plotter then calculates and plots the best fit line between your points.

Letters, numbers, and 30 ASCII symbols can be reproduced on the DMP-29 in any of nine heights (0.07" to 1.12"), and in any of four degrees of rotation (0, 90, 180, and 270) by using a single command.

If you want to get even fancier, an extended text command is available. This command accepts up to six parameters which specify character height and width (255 alternatives), normal or italics, character set (only one is available at present), and the degree of rotation (0 to 360 degrees).

Six marker symbols are also available for marking points on a graph, axes, and boundaries. Like the ASCII symbols, these can be plotted in nine different sizes.

Digitizer Mode

In addition to acting as a plotter, the DMP-29 can be used as a digitizer input tablet. In this mode, the plotter transmits x,y point data to the computer for processing. The computer must be programmed to receive two five-digit coordinates, followed by a carriage return.

After the digitize command (ED) is received by the plotter, the plotter bed is your "pad," and the pen is the cursor. You maneuver the pen using the nine directional movement keys on the keypad. When the pen is set correctly, you press REPORT, and the coordinates are sent to the computer.

Documentation

The DMP-29 plotter comes with an 82-page manual. It is marked "Preliminary," but apparently the final one is not yet available. As computer peripheral manuals go, it is neither the best or the worst.

In its favor, most of the plotter commands are adequately described and examples are given. On the other hand, the examples stop far short of producing "real" plots with axes and labels. Furthermore, all the example commands are listed as LPRINT XXX, whereas most computers use PRINT #1 to send information to the RS-232 port.

The section on interfacing the plotter to a computer should mention that most computers will require a reversed cable, and that a pin-to-pin cable will not work.

Nevertheless, with a bit of patience and experimentation with the pen in the up position, the manual enabled us to draw some interesting plots in an hour or so.

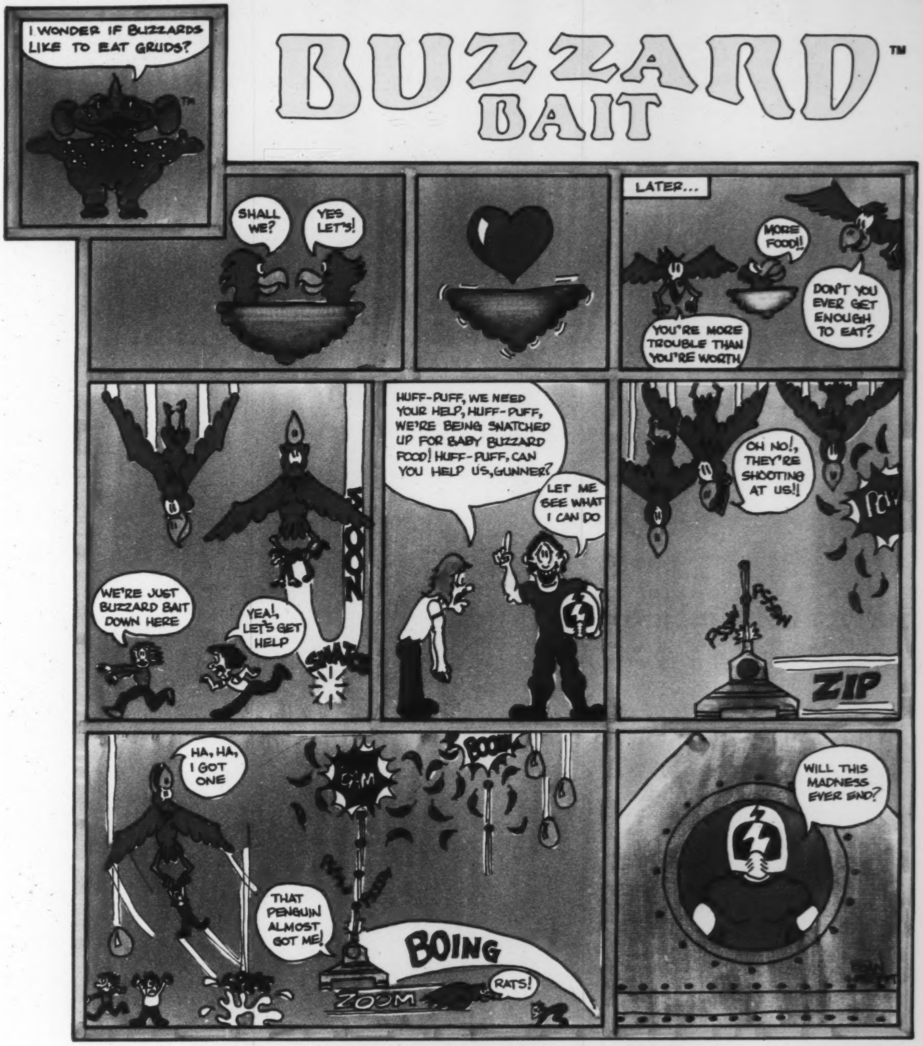
In Summary

The DMP-29 plotter is an amazing piece of engineering. The wide variety of built-in commands make it easy to draw complicated and exotic plots. The general curve-fitting feature is especially useful for producing graphs. Also useful are the ten types of dotted lines and six marker symbols.

For computer artwork, the DMP-29 boasts many valuable features including automatic reproduction and scaling of plots, easy resetting of the pen origin, and absolute or relative pen positioning. The three step sizes and five pen velocities allow either "quick and dirty" or extremely detailed plots. Repeatability with the same pen is quoted as 0.004" and with a different pen, 0.008"; we found that these slight inaccuracies were not noticeable on most plots.

The ability to use the DMP-29 as a digitizer is a nice extra. The documentation with the plotter is fair, but would benefit from some longer examples of "real" plots. All in all, the DMP-29 is exceptionally versatile, user-friendly, and cost effective. ☐

BUZZARD BAIT™


I WONDER IF BUZZARDS LIKE TO EAT GRUDS?
SHALL WE?
YES LET'S!
LATER...
MORE FOOD!!
DON'T YOU EVER GET ENOUGH TO EAT?
YOU'RE MORE TROUBLE THAN YOU'RE WORTH
HUFF-PUFF, WE NEED YOUR HELP, HUFF-PUFF, WE'RE BEING SNATCHED UP FOR BABY BUZZARD FOOD! HUFF-PUFF, CAN YOU HELP US, GUNNER?
LET ME SEE WHAT I CAN DO
OH NO!, THEY'RE SHOOTING AT US!!
WE'RE JUST BUZZARD BAIT DOWN HERE
YEA!, LET'S GET HELP
ZOOM
SNAP
ZIP
HA, HA, I GOT ONE
BOOM
BAM
THAT PENGUIN ALMOST GOT ME!
BOING
ZOOM
RATS!
WILL THIS MADNESS EVER END?

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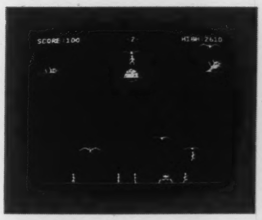
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GAME DESIGN BY MIKE RYEBURN

Game design by Mike Ryeburn.
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creative
computing
equipment
evaluation

The Olympia Electronic Compact Printer

Will Fastie

Every day, great strides are made in dot-matrix printer technology. The capabilities of such machines are constantly on the rise, while the quality of their printing gets ever better. Nonetheless, the print quality of fully formed impact printers is still superior to the majority of dot-matrix machines. The boom in small computer sales has created a new market for low-cost, letter-quality printers. The Olympia Electronic Compact is one such product.

What makes the Electronic Compact most interesting is its keyboard. To the naked eye, the device looks like an electronic typewriter. That is an accurate assessment, because the only difference between it and a typewriter is the provision it makes for either a serial or parallel computer interface.

This "combination" printer must be examined in both its roles to understand fully its capabilities and limitations. However, the basic characteristics of the unit are the same in either case and will be examined first.

General Characteristics

Specifications for the Electronic Compact are given in the Hardware profile.

A quick glance at the machine shows it to have all of the standard typewriter features. The keyboard layout is reasonable, with the keys for tab and margin settings on the right, out of the way of the QWERTY key area. The left side of the keyboard includes a margin release key and switches to set pitch (10, 12, and 15), line spacing (1, 1-½, and 2), and print density (i.e., how hard the paper gets hit, three settings). Also included is a correction key.

Directly above the keyboard is the margin scale. Each of the three pitches has its own independent scale. Plastic slides can be moved to indicate the actual margin settings, although their position does not actually affect the setting.

The margin scale is transparent; behind it is a position indicator that lights when the power is turned on. The indicator on the tested machine seemed to be offset a little from the actual position of the typing element, but in practice it can be adjusted by loosening a screw and sliding the lamp to the right or left.

> ***It is hard to decide whether or not the Electronic Compact is a satisfactory typewriter.***

The cover, which includes the margin scales, snaps off to reveal the carriage mechanism. This gives access to the ribbon, the correcting ribbon, and the printwheel, all of which are relatively easy to install and remove. Installation of the cartridge ribbon is especially easy, as the ribbon guide rises and moves slightly forward, thus releasing the tension and allowing the ribbon to slip easily away from the carriage.

On the top of the machine is a cover which, when lifted, becomes a paper support and guide. I assume that the primary reason for allowing the guide to fold down is to allow the entire machine to be protected with the supplied vinyl cover, although some measure of dust protection is provided by the guide.

The power cord plugs into the left side of the printer. The power switch is located just forward of the plug. Although the placement of the switch is convenient, the power cord tends to get in the way. A better location would have been on the rear. Just above the power switch, also on the left side, is the platen knob; there is no knob on the right.

On the top right of the machine are two levers. One moves the paper bail and other retracts the friction rollers and displaces the paper bail by about 3mm.

Will Fastie, Suite 211, World Trade Center, Baltimore, MD 21202.

The machine comes with one printwheel which can be used at either 10 or 12 pitch. It looks best at 12, and can even be pushed to 15 pitch without too much character overlap. The printwheels are Olympia (as opposed to Qume or Diablo) and were not listed in any of the catalogs I checked. They can be ordered direct from the manufacturer.

The Typewriter

It is hard to decide whether or not the Electronic Compact is a satisfactory typewriter. The test machine was used extensively for this purpose by a variety of typists. While all preferred it to a manual typewriter, none preferred it to an IBM Selectric or other standard office machine.

The keyboard has a nice feel and is easy to use. Placement of the keys is standard except for the correcting key, which is appropriately placed next to the backspace key. It is not difficult to figure out how to work the machine.

There are two major irritations with the typewriter that all typists were quick to spot and complain about. First, it does not remember the margin and tab settings when it is turned off. When turned on, it assumes margins of 20 and 85 (set for 10 pitch) with no tabs. We used it mostly in 12 pitch, so this setting was particularly irksome. One of the secretaries who tried the machine to do a complicated table was infuriated when she innocently turned the machine off over lunch, only to lose 21 tab settings.

The second problem is more psychological. Every one of the typists who tried the machine felt that it lagged behind their keystrokes. There is a noticeable delay (most of us felt it was a half-step) between the striking of a key and the impression of the character. The result is strike-print-strike-print-strike in a steady rhythm. The effect is to create the illusion that you are typing too fast, and the tendency is to slow a bit. None of us could get over this problem and none of us reached our normal typing speeds on the machine.

We were also interviewing secretarial applicants and giving typing tests; after comparing the same applicant's results on both the Olympia and a Selectric, we were forced to make a speed allowance for the former.

The Printer

As a computer peripheral, the machine again has its problems. Most irritating is that there does not appear to be a way to set up the machine under computer control. Margins, spacing, and tabs must be set manually.

Registration is another problem, although here I may be too severe with my criticism. I am used to the very high precision of the Diablo 630 and have not had an opportunity to compare the registration of the Olympia with other printers in its price range. Overall, the precision of the machine is good, but periodically its line spacing varies.

creative computing
HARDWARE PROFILE

Print Speed: 11 characters per second

Power Requirements:
220 volt / 50 Hz
115 volt / 60 Hz (U.S.)

Power Consumption: 50 watts

Printwheel: Olympia 96 character

Ribbon: Olympia Carbon Cassette

Correcting Ribbon: Standard (i.e., IBM or equivalent)

Carriage:
Platen Length: 346 mm (13.6 in)
Writing Line: 292 mm (11.5 in)
= 115 characters at 10 pitch
= 138 characters at 12 pitch
= 172 characters at 15 pitch

Dimensions:
Width: 492 mm (19.4 in)
Depth: 383 mm (15.1 in)
Height: 150 mm (5.9 in)

Weight: 9 kg (20 lbs)

Price: $999

Address:
Olympia USA Inc.
1625 Adrian Rd.
Burlingame, CA 94010

The tested machine was equipped with a parallel interface so it could be used with an IBM PC. The standard unit comes with a serial interface. I do not know how the serial cable is connected, but the parallel cable (a ribbon cable) was threaded through the air vents on the rear of the machine. To do this, two posts were broken from the vent to make enough room to allow the passage of the cable. This seemed somewhat inelegant.

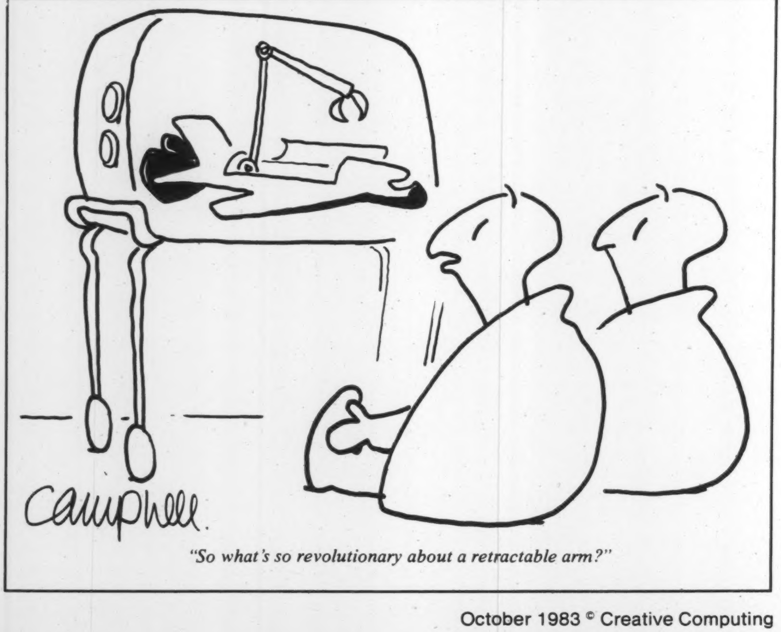
The Documentation

The manual that came with the machine is the European version written in English, French, and German. It was bad enough that the English instructions were interspersed amongst the others instead of being separated. What was worse was the picture of the keyboard with a chart explaining the functions of all the keys. The keyboard pictured is the European version with symbolic legends instead of the English legends that actually appear on the keyboard.

The documentation could be improved by printing a photograph of the U.S. keyboard and by organizing the book so that all the instructions in a particular language are together.

Summary

If I had to make a recommendation for a printer, I would not recommend the Electronic Compact. If I had to make a recommendation for a typewriter, I would pass again. But if the requirement was for both on a limited budget, I would give the Olympia a serious look. ☐



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WE SEE F

SOFTWARE ARTISTS? It is a name these people are uncomfortable with.

"I'm not so sure there *are* any software artists yet," says Bill Budge. "Maybe we've got to earn that title."

Pictured here are a few people who have come as close to earning it as anyone we know. They are people who expect—even presume—a deeper involvement of your imagination. They envision programs that will teach you by experience rather than memorization. They want to blur the traditional distinctions between art and entertainment and education and fantasy.

ELECTRONIC ARTS™

FARTHER

BILL BUDGE

(top row; far right) is something of a hero within the burgeoning software movement. He's done things with code that cause veteran designers to blink in disbelief. Maybe his accomplishments are the result of his nearly poetic talents in the arcane algebra of machine language, or maybe they're the outgrowths of things he thinks about—like software friends, whole universe inventions and the emotional values of computerdom. Whatever the causes, there is general agreement that his PINBALL CONSTRUCTION SET is the most powerful program ever written for an 8-bit

by experience rather than memorization. They want to blur the traditional distinctions between art and entertainment and education and fantasy.

In short, they are people who may, over the next decade or so, change your life. And for that reason, you should know them.

MIKE ABBOT and MATT ALEXANDER

HARD HAT MACK
MICHAEL ABBOT & MATTHEW ALEXANDER

(far left, front and back row) are from San Diego. They know a thing or two about gravity. They know about the work ethic and how people like vandals and OSHA Inspectors can get in its way. And they used this knowledge, along with a large measure of charm, to devise a surprisingly funny, habit-forming game known as HARD HAT MACK. Bet you can't play it just once.

DAN BUNTEN

(second from left, top row) is but one part of Ozark Softscape, the guys who created M.U.L.E. What they've made here is a race to settle a distant planet, full of opportunities to fleece and sandbag the people dear to you. *Creative Computing* said "the graphics, sound, and humor are superlative." But that's little comfort when your Dad's got all the food and he's starving you into oblivion.

JOHN FIELD

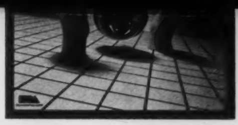
(bottom row, second from the left) is not afraid of relentlessly attacking hunters and spores. He's not afraid of bats or fire lizards or robots and their nutty death beams. He's not afraid of them because he made them all. They're part of AXIS ASSASSIN and THE LAST GLADIATOR—things that came out of his own head as he lived his teenage life in Palo Alto, California, and drove the rim of the continent in his real fast, red car.

AXIS ASSASSIN

ELECTRON

Available for Apple, Atari, and

that his PINBALL CONSTRUCTION SET is the most powerful program ever written for an 8-bit machine. If you're the least bit skeptical of what these computers are really worth, you ought to watch PINBALL in action. You'll see.



ANNE WESTFALL

(second from right, back row) is something of a sorceress. Her raw materials are the ambitious and idealistic gaming concepts that proliferate at Free Fall Associates. Her magic takes place in a thunderclap of code. Her most recent creation is ARCHON, a program that combines the strategy of chess with the white-hot action of arcade combat. Oh, by the way, one of the key characters in ARCHON is a sorceress. Imagine that.

ARCHON
THE LIGHT AND THE DARK

JON FREEMAN

(third from left, top row) dreamed of a computerized who-done-it that wouldn't wear out after thousands of plays. He wanted it to have complex, shifting motives, characters with elements of personality, and he wanted it to happen on a dirigible. With the help of his friends at Free Fall Associates, he got it. The name is MURDER ON THE ZINDERNEUF and it never happens the same way twice.

MURDER ON
THE ZINDERNEUF.

DAVID MAYNARD

(arms folded) never intended that his innocently entitled WORMS? should become the Air Force's secret I.Q. test for alien species. He does not endorse the wanton gambling cult that has sprung up around this product. And he deeply regrets the inhumane uses it has been put to by the Bulgarian Secret Police. "WORMS?," he says, "was only meant as a lighthearted exploration of limited artificial intelligence using pretty light and simple music." Right, David.

NIC ARTS

and Commodore computers.

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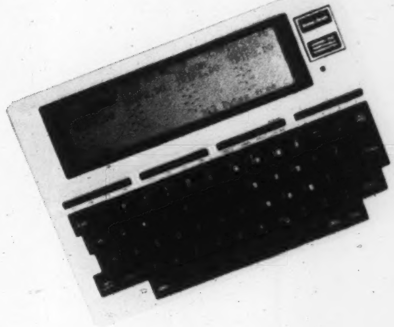


Businesspak+

Glenn A. Hart

The new Radio Shack Model 100 portable computer is a wonderful tool for the travelling executive. Its full size keyboard, large 8-line by 40-column display, built-in modem and cassette, parallel and serial interfaces make it a flexible and powerful tool that can be used almost anywhere.

This fine hardware is combined with excellent software included with the Model 100. Stored in ROM and always available, an easy-to-use text entry program, Microsoft Basic interpreter and scheduling and note taking programs are quickly learned and quite flexible. Nevertheless, there are enhancements to the Radio Shack software that would provide even greater utility for the executive.

The first third party software for the Model 100 addresses exactly these needs. Designed specifically for the businessman, *Businesspak+* is a package of six programs from Dallas-based Portable Computer Support Group which adds tremendous flexibility to the Model 100 while retaining the ease of use of Radio Shack's own software.

The programs employ both the Basic built in to the Model 100 and machine language calls to the ROM routines provided by Radio Shack. While PCSG is not related to Radio Shack in any way, the geographic closeness has evidently led to a corporate closeness as well. PCSG claims to have "torn apart" the Model 100 ROMs, and judging from the way the programs operate, they have done their job well.

The six programs in the package include a text formatting program to expand the built-in text entry program into a complete word processor, an excellent expense account maintenance program which includes many aspects of a spreadsheet, a screen-oriented data entry program which allows designing custom entry screens and maintains data in consistent internal formats, a sort utility to arrange such organized data files, a graphics program to generate pie, bar, and line graphs, and a marvelous Telex/ECOM program which provides access to the wide range of telecommunications services through these professional networks from the Model 100!

creative computing

SOFTWARE PROFILE

Product: Businesspak+

Author: Michael Stanford

Type: Business

System: TRS-80 Model 100

Format/Language: Basic and machine

Performance: Excellent

Ease of Use: Extremely easy

Documentation: Excellent

Price: $89.95

Summary: Excellent business software that extends the utility of the Model 100 ROM software.

Overall Mark: Excellent

Manufacturer:
Portable Computer Support Group
1105 Harry Hines Blvd.-Suite 207
Dallas, TX 75229
(214) 351-0564

Write+ Word Processing

The PCSG "word processor" uses the standard text entry program supplied with the Model 100. As Model 100 owners know, the text entry program is easy to learn and simple to use, yet flexible enough for nearly any reasonable text manipulation.

The PCSG program formats text when printed. Two methods are used to indicate the user's formatting desires. A special text file called W+SPEC.DO stores default values for various standard printing options (see Table 1). This file can be edited to change the default values. The other method is to imbed commands in the text file itself to instruct the formatting program to take special action. As in many other such programs, the traditional "dot command" concept is used. A period in the leftmost column indicates a command, and the letter which follows specifies the exact action desired. The PCSG program uses only a single character; the letter codes chosen are as related to the function called as possible (see Table 2).

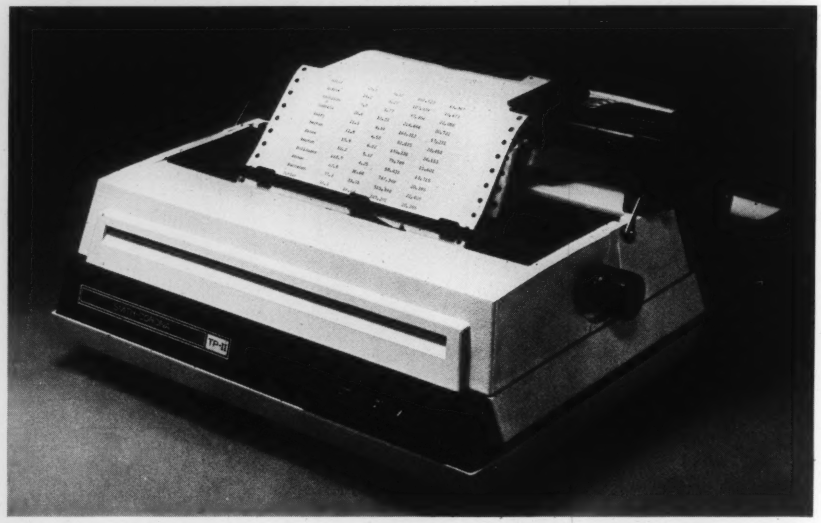
The functions provided are quite comprehensive and allow many standard word processing features such as justification (with extra spaces only, no proportional printing), centering, headers and footers, page numbering, and adjustment of indentation and margins. The command syntax is so easy that there is very little learning time required—an important consideration for the executive target audience.

Control characters can also be imbedded anywhere in the text file (not only at the beginning of a line) to control special printer capabilities like underlining, boldface, etc. The method is identical to that used in *WordStar*, i.e., a CONTROL-P imbeds the next character, which is then sent directly to the printer when the file

---

Glenn A. Hart, 51 Church Rd., Monsey, NY 10952.

Smith-Corona makes a successful printer even better. Introducing the TP-II.



When Smith-Corona® introduced the TP-I™ daisy wheel printer, it filled an important need. It gave home users and small businesses the opportunity to have high-quality letter-perfect printing at the lowest price to that time. No wonder it's been such a success!

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The TP-II has all the features of the TP-I. It's compatible with most microcomputers. It handles letter and legal sized paper. There's an optional tractor feed for handling fanfold paper.

Dual Interface

But the TP-II has some significant improvements, as well. It can interface with both serial and parallel computers. Which means you can upgrade your computer whenever you want without having to buy a new printer, too.

Letter-Quality Printing

The TP-II has the same excellent print quality as the finest office typewriters. There's a choice of easy-to-change daisy wheels to give you a wide variety of print styles and languages. (At $7.95 each, you can easily afford several.) There is a new ASCII 93-character printwheel with all the characters necessary to print out computer program listings, as well as printwheels in seven foreign languages.

Self-Testing

The Self-Test Switch lets you automatically print out a test pattern to check on the TP-II's operating condition. You can easily set DIP switches for baud, parity and character bit length. Plus it offers carriage return line feed, as well as a new 256 character buffer.

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Add to all these features the fact that the TP-II is made in America by a company that has earned a reputation for reliability. A company that backs its printers (and everything else it makes!) with a national factory service network and an 800 number you can call if you have a problem.

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is printed. The current version of Write+ is designed for parallel printers, which is the normal output port for the Model 100. A serial printer version would not be hard to program, and PCSG will probably add this capability in a future release.

While it certainly lacks many functions, the PCSG program generates printed output which is much more attractive than the simple-minded Radio Shack output routines. All functions worked exactly as described in the excellent documentation. Output on both a daisywheel printer and several dot matrix printers was truly impressive and fully business quality. This is a first-rate program that almost justifies the cost of the entire software package all by itself.

Expns+ Expense Report Generator/Spreadsheet

Travelling executives use a wide variety of methods of keeping track of expenses. While scrupulous notes certainly work, a final report must still be prepared, and some of the complex books or electronic alternatives are almost always more trouble than they are worth. Expns+ is different. It is very easy to use, extremely flexible and prepares a well formatted final report.

The program uses text files to store report headings, expense categories, and period designations like the day of the week, date, or whatever. Up to 18 categories and 12 periods can be handled, more than enough for most applications. The user can modify any of the text entries to customize the program for his needs.

Expns+ first asks which data file to access; the user can maintain many different ones if desired. A time period is chosen, e.g., Wednesday, and then the 18 expense categories appear on the display. Moving the cursor to one and hitting ENTER clears the screen and shows any previous entries in the category for that period, and also allows entering new expenses. Up to 18 entries can be made in each category for each period. The bottom of the display shows cumulative expenses for the period and in the expense category.

Each numeric entry can be followed by a one character "note." Each category can accommodate its own set of notes, so a lower case *a* in the Tips category is distinct from an *a* note to Breakfast. The meaning of each note is stored in the text file and prints out on the final report as a footnote. During data entry, a function key scrolls all notes which have been entered into the text file in case the user has forgotten the meaning of a note or which one should be used.

Expns+ has a Replication feature which allows a constant expense to be copied into a succession of cells. A multiplier value can be specified to grow or decrease the amount by a constant. This is very useful to help convert Expns+ into a simple spreadsheet program rather than simply storing expenses. PCSG includes a model for corporate budgeting and provides ample instructions on how to use the program as a spreadsheet. While the program does not contain many of the useful functions found in a *SuperCalc*-type program, rather sophisticated what-if analysis, forecasting, and other typical spreadsheet applications are easy to implement.

Expns+ does a wonderful job of tracking expenses.

Table 1. Variables Stored in W+SPEC.DO File.

Lines Per Page
Line Length
Top Margin (number of lines)
Bottom Margin (number of lines)
Left Margin (column)
Right Margin (column)
Printing Lines Per Page
Header Text (%D gives Date, %T Time, %P Page Number)
Footer Text
Header Switch (1=Header On, 0=Header Off)
Footer Switch (same)
Format (Normal, Justified, Centered)
Line Spacing
Start Printing at Page Number N
Last Page Number to Print
Number of Beginning Page in Document
Number of Copies
Pause Between Pages (1=yes, 0=no)
Output to what Device

Table 2. Write+ Imbedded Dot Commands.

.Ln	Set left margin to n
.Rn	Set right margin to n
.J	Justify right margin
.N	Ragged right margin (normal)
.C	Center all text
.Un	Move paper Up n lines (skip lines)
.P	Start a new page
.Fn	Footer On/Off Switch
.Hn	Header On/Off Switch
.Mn	Start a new page unless n more lines will fit on current page
.Sn	Line Spacing Control

Reports can be generated at any time and look like a spreadsheet created with *VisiCalc*, *SuperCalc*, or the like. Expns+ handles reports too large to fit on one page just as these other programs do; multiple pages are created which can easily be spliced together.

Expns+ does a wonderful job of tracking expenses. I used it to store expenses on a ten-day trip starting the day after I received the software, and I have never used a better system. I'm sure I would have forgotten some minor expenses if I were using written notes, and program operation was so intuitive after a few minutes that using the Model 100 to store expenses was actually fun!

Graph+ Graphics

Graph+ creates pie, bar, and line graphs from data entered with the Expns+ expense program. Since Expns+ can be used as a spreadsheet as well, the combination can plot any desired data. The main heading entered with Expns+ is centered over the graph; the other headings follow. Labels are used as appropriate and are also obtained from the Expns+ file. Either row or column values can be plotted. Pie charts are fixed to a three-inch diameter, while bar and line charts can be any horizontal or vertical size that will fit the paper in use.

At present, Graph+ works only with Radio Shack's Model DMP 100 matrix printer. While this is a reasonable choice as a companion to the Model 100, many users may have other matrix printers. By the time this article appears, Portable Computer Support Group should be providing either customized versions or instructions on how to use other printers.

I don't have a DMP 100, but Graph+ worked perfectly when I tried it at a Radio Shack store. The program is so easy to use that executives should be able to spice up their printed output with graphs even without knowing anything about the sometimes complex and confusing world of computer graphics.

Put+ And Sort+

The Put+ program works much like programs like *DataStar* and other data entry utilities. It is easy to define an entry screen to collect up to 16 data fields. The user can select prompting messages and specify the permissible length of each field, as long as everything fits on one display screen (no multiple screen forms are possible).

When the program is invoked, the user selects which screen file to work with. The Model 100 display fills with prompts and entry fields indicated by solid blocks of the appropriate length. As data are entered, the down arrow key is used to move to the next data field and RETURN stores the data into memory. This is a bit annoying, since it is more intuitive to hit RETURN after each field. I would prefer a control character to accept the entire screen of data (Control-W for Write?), but it appears that PCSG tried to stay away from control characters in general, probably thinking that executives wouldn't feel comfortable with them.

In any event, the entered data are stored to RAM in a fixed position format. While examining the created file is confusing, since the fields don't appear to be lined up due to the Model 100 word wrap, the fixed format allows the companion Sort+ utility to sort the data on any field, either alphanumeric or numeric.

The operating method Sort+ uses is quite similar to Put+, which makes the combination easy to learn. When Sort+ is first invoked, the desired file is chosen and the same display screen used to enter the data with Put+ appears on the display. The user simply moves the cursor to the field to sort on and hits RETURN. The sort proceeds quite quickly. With either utility, the file created can be saved to cassette and/or retained in RAM.

Both programs work as advertised, and can be quite helpful if reasonably large amounts of data are to be manipulated with the Model 100. I tend to think, however, that this is not a primary use for this computer, and with smaller data lists it isn't too hard simply to use the text editor and be sure to maintain consistent formats. Nonetheless, Put+ and Sort+ work well and could be useful to some users.

Telex+ Telecommunications

Telex+ provides access to many of the telecommunications services offered by Western Union's Telex service, but without the need for a dedicated Telex line. Even more remarkable, the same program can be used to send the Postal Service's new ECOM computer mail. An ECOM is similar to a MailGram, but is delivered within two days of entry. ECOM messages cost much less than MailGrams and have similar impact. Since the program is designed for large volume users, the Post Office requires the user to send at least 200 ECOMs at a time, which pretty much lets out the small microcomputer user. As we shall see, however, the PCSG program lets you send even one, which is actually cheaper than a stamp, envelope, and paper!

The Telex+ program depends on Action Telex Inc., a special Telex "service bureau" company based in Dallas with offices in 14 major US cities. The PCSG package include a free trial of the Action Telex service. The user calls PCSG and is given a temporary ID number which allows sending three Telex or ECOM messages. Thereafter, he must subscribe to Action Telex, which cost $150 a year with no minimum monthly billing. This may seem like a lot to someone not familiar with Telex, but it is actually a bargain given that a dedicated Telex line alone costs $50 a month.

Sending a message is simplicity itself.

Sending a message is simplicity itself. When Telex+ is invoked the user is asked to select a text file which has been previously prepared using the normal Model 100 editor. A choice of Telex or ECOM is requested. The program asks for the Telex number (or name and address for an ECOM) of the recipient. A pre-stored default number can be selected if desired. The program then dials the local Action Telex office, sends the message, renames the file by changing the last letter of the filename to X to show it has already been sent, and logs off—all totally automatically. If a printer is connected, the program also generates a hard copy of the message for file purposes.

As if this weren't enough, Action Telex offers a wide range of special services as well. A system called ActionGram can be used to send messages to the UK, Western Europe, Australia, New Zealand, South Africa, Hong Kong, and part of South America, even if the recipient doesn't have a Telex machine. Much less expensive than an international cable, delivery is usually next day, and replies can be prepaid. International Telexes are also accepted, and the system also allows the same text to be sent to multiple domestic ECOM addresses or Telex machines, using Put+ and Sort+ to prepare the mailing list files if desired.

The Telex network can be quite confusing, even to experienced users. Telex+ and the Action Telex services reduce the difficulties to an absolute minimum. The entire system worked correctly the first time I tried Telex, ECOM, and the other services. PCSG should be commended for this excellent program. Many users will soon wonder how they got along without these services.

Summary

To say that I am impressed with the *Businesspak+* package is an understatement. "Human engineering" is rapidly becoming an overused and even trite phrase, but I have rarely seen as much of it in any software package, even ones selling for many times the cost of *Businesspak+*. Not only are all the programs very easy to learn and use, they follow the innate operating procedures of the Model 100 so closely that it is hard to tell where the ROM routines stop and the cassette software starts.

Other aspects of the package are also first rate. The use of Model 100 function keys is excellent, documentation is lucid, to the point, and accurate. PCSG support is friendly and knowledgeable. When I called to get my Action Telex number, I made several suggestions or minor enhancements; a new cassette incorporating all my ideas arrived a couple of days later!

The package is distributed on six cassettes, each containing several copies of each program to insure accurate loading. The Model 100 is developing a reputation for finicky cassette loading, but I had no trouble loading any of the *Businesspak+* programs.

Businesspak+ is one of the few software packages I have ever recommended almost without qualification. Its $89.95 cost is a bargain, and I cannot imagine any Model 100 owner being without it. □

"Don't look now, but I think there's an imposter among us..."

MAXI CRAS

THE CHECK REGISTER ACCOUNTING SYSTEM FOR PERSONAL AND SMALL BUSINESS USE

WHAT IS MAXI C.R.A.S.?

Maxi C.R.A.S. is THE computerized check writing and record keeping system for small business and personal use. But don't take our word for it! Compare it with any other system available for your computer. Read through our manual, and look at the printed reports that Maxi C.R.A.S. produces. Then talk to one of the thousands of people who use it. We're sure you'll agree — Maxi C.R.A.S. is the most versatile system available.

WHO CAN USE IT?

Almost anyone! Maxi C.R.A.S. is designed for people interested in gaining more control over where their money goes. Maxi C.R.A.S. is powerful enough for small business use, yet so easy to use that it's ideal for your personal finances too. It takes the work out of everything associated with a checking account: printing checks, balancing your account, reconciling bank statements, and keeping extremely accurate records. And those accurate records are delivered in the format required for income tax preparation!

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Check Register Notes
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Individual Account Activity Report
Account Distribution Statement (audit trail)
Checkbook Reconciliation Statement

BUT WILL IT WORK WITH MY SPREADSHEET PROGRAM?

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- Complete, easy-to-understand User's Manual.

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CIRCLE 106 ON READER SERVICE CARD

Dow Jones News & Quotes Reporter

Dennis Costarakis

Investors can obtain news, prices, and financial information on their investments easily with the *Dow Jones News & Quotes Reporter* from Apple Computer. This program turns *any* Apple II into a smart terminal with access to a broad range of financial and general news information from the Dow Jones News/Retrieval database service.

The *Reporter* package, which comes in a box suitable for storage on a bookshelf, contains one disk with the program, the operating manual for the program in the standard Apple spiral bound format, and a copy of the Dow Jones News/Retrieval Fact Finder. The Fact Finder is the 198-page Dow Jones publication that provides the instructions and symbols necessary to access and use the various portions of the Dow Jones database. The manuals and program are straightforward and easy to use.

On booting up, the program checks to see whether an 80-column card is installed; if so, the program automatically runs in 80-column format. If you have an Apple IIe, you won't have any problems. But if you have an older 80-column card as I do, you may have to upgrade your 80-column board firmware. If your 80-column card does not support the Pascal 1.1 Keypress function, the program will not work in the 80-column mode. In fact, you must remove the 80-column board from the computer, because the program searches for an installed 80-column card and if a card is found it automatically runs in the 80-column mode. The only way to run in 40-column mode is to remove the 80-column card—a definite nuisance.

I think a professionally programmed package like this could have been programmed to run in 40 or 80 columns, as the user desires, without having to remove the 80-column board. When using the program in the 80-column mode, the lefthand side of the screen (columns 1-40) is used most of the time. The screens of information are not centered on the monitor. In using the program, I suspect this is due more to the way the Dow Jones News/Retrieval database transmits data than to the programming, but perhaps not.

> ***The more quickly you retrieve the data you want, the cheaper it is.***

Checking Your 80-Column Card

If you don't know whether your 80-column card supports the Pascal 1.1 Keypress function, you will find out as soon as you boot up this program. With the 80-column card turned on, you see and hear (it ticks like a ticker tape) the title print out a letter at a time. When you press RETURN (as directed by the program) to continue, and the program proceeds to the next "page," you have the Pascal 1.1 Keypress function. If nothing happens when you press RETURN, you must remove your 80-column card and use the program in the 40-column mode until you can upgrade your firmware.

creative computing
SOFTWARE PROFILE

Name: Dow Jones & Quotes Reporter
Type: Communications/Financial
System: 48K Apple, modem and interface card, or super serial card, or D.C. Hayes Micro-Modem II auto dial modem.
Format: Disk
Language: Pascal (self-contained on program disk); language card not necessary
Summary: Program for retrieving news and financial information from Dow Jones databases.
Price: $135
Manufacturer:
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010

Dennis A. Costarakis, 3562 Union St., San Diego, CA 92103.

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AD455

Dow Jones, continued...

If your 80-column card is installed and turned off when you boot up, you will see a blank screen with a cursor in the upper left corner and the "ticking" sound of the program introduction. When it stops, you will still have a blank screen and no use of the program or the computer. Actually, the program is running in the 80-column mode. At first, when this happened, I thought the program was defective because I then booted up another program that worked fine.

I recommended to the project manager at Apple Computer that they include a notice to purchasers that the program will only work as described above. These points are not specifically addressed in the manual, and are only alluded to in the list of equipment table in the back of the manual.

Once the program is booted and the copyright notice appears, note that the package you have is version 2.0, the latest version available. When the RETURN key is pressed to continue (as directed by the program), one of two things happens: either a notice that the program cannot find a communication card appears, or, if you have a modem properly installed, the main menu appears (Figure 1).

You progress through the program with a consistent format. In general, the RETURN key is pressed after each input to proceed to the next step. The ESCAPE key is used to return to the previous screen or display. If you press the ESCAPE key enough times you eventually return to the main menu. Pressing RESET causes the system to re-boot. I was unable inadvertently or deliberately to break out of the program.

It appears to be error trapped extremely well, with one exception. When you attempt to print data from the screen to your printer in the 40-column mode, and your printer is turned on, but is off-line, the program responds with a reminder to turn on your printer. If you are in the 80-column mode and your printer is off-line when you attempt to print, the monitor screen goes berserk, similar to a Fourth of July fireworks display. Placing the printer back on-line and pressing RETURN returns the program to normal operation and prints the last screen of information shown on the monitor. This information is not in the manual.

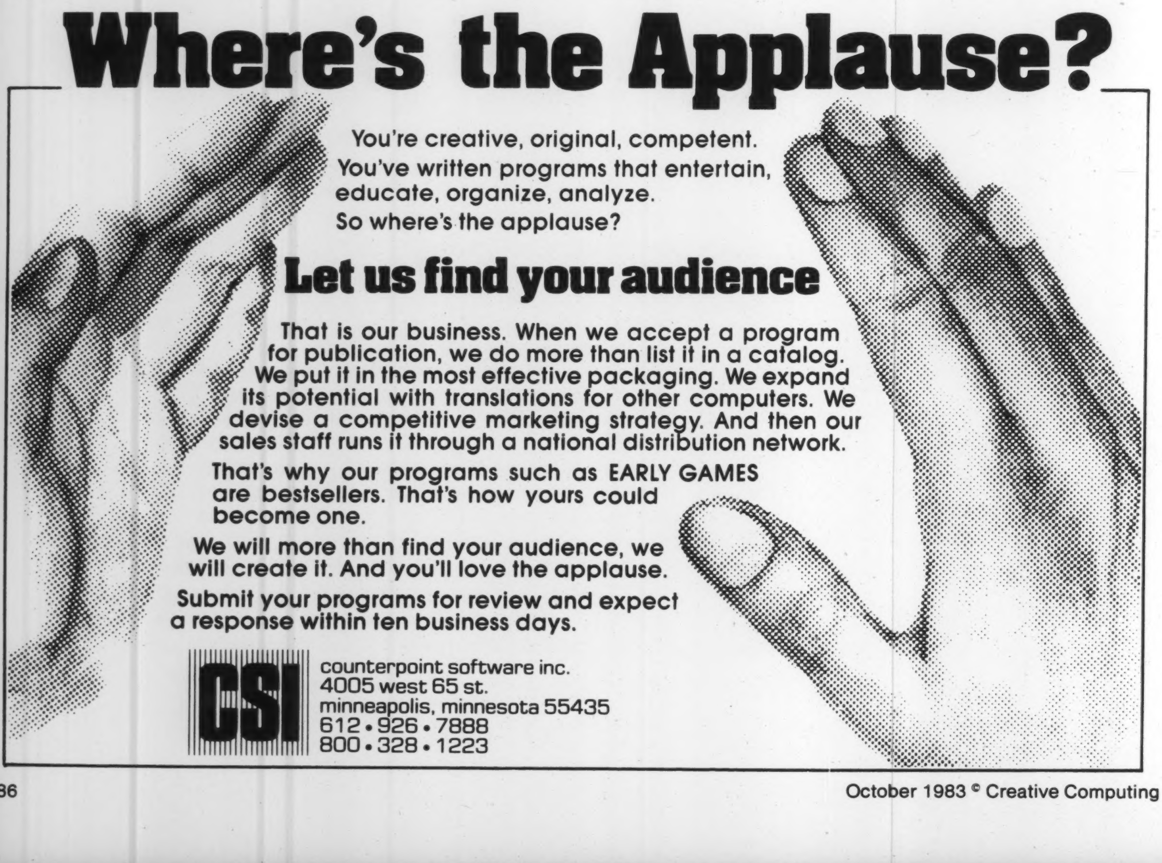
```
          DOW JONES
 NEWS & QUOTES REPORTER


 1.  NEWS RETRIEVAL SERVICE
 2.  QUOTE SERVICE
 3.  ADDITIONAL INFORMATION SERVICES
 4.  CUSTOMIZING FEATURES
 5.  DISCONNECT FROM DOW JONES
 6.  EXIT NEWS & QUOTES REPORTER


 ENTER YOUR SELECTION  ☐
```

Figure 1.

Automatic Dialing

The Dow Jones News & Quotes Reporter has a customizing feature that allows you to store on disk all the necessary information to dial automatically and log on to the Dow Jones News/Retrieval database. The following information is stored:

- The local telephone number for the network desired.
- An alternate network telephone number if the first is busy.
- Your password (which cannot be read from the monitor—to conceal it from prying eyes. You can safely demonstrate the program without someone borrowing your user I.D.).
- The name of the local area network through which you are connecting (Tymnet, Telenet, or Bell Canada Datapac service).
- Whether log on will be automatic or manual.


Where's the Applause?

You're creative, original, competent.
You've written programs that entertain, educate, organize, analyze.
So where's the applause?

Let us find your audience

That is our business. When we accept a program for publication, we do more than list it in a catalog. We put it in the most effective packaging. We expand its potential with translations for other computers. We devise a competitive marketing strategy. And then our sales staff runs it through a national distribution network.

That's why our programs such as EARLY GAMES are bestsellers. That's how yours could become one.

We will more than find your audience, we will create it. And you'll love the applause.

Submit your programs for review and expect a response within ten business days.

CSI
counterpoint software inc.
4005 west 65 st.
minneapolis, minnesota 55435
612•926•7888
800•328•1223

- Whether or not you are using an 80-column card.
- Whether you want to be automatically disconnected from Dow Jones when you aren't actively using the service. This feature will automatically disconnect you after two minutes of inactivity to prevent excessive charges.

Once you have verified the data, they are stored on the program disk for future use. The main menu appears after the customizing data have been saved.

Main Menu items 5 and 6 (Figure 1) allow you to disconnect from the database rapidly and to exit the program when you are done. The program also reminds you to disconnect the phone from the modem and tells you the program has concluded. Items 1, 2, and 3 of the Main Menu allow you to dial directly into that section of the database you desire to use first.

Moving Within Database Sections

Once on line, you can get to either of the other two database sections by returning to the Main Menu via the ESCAPE key and using the menu selection numbers, all while you are on line. It is quite an effective way to move between database sections easily and rapidly. Remember that you are paying for database access time by the minute. The more quickly you retrieve the data you want, the cheaper it is.

The program user manual provides several diagrams that illustrate how the various parts of the program and database are interconnected, how to proceed from segment to segment, and how the ESCAPE key functions to return you to the previous step. The diagrams are simple to read and understand and are a great help in using the News and Quotes segments of the database. They also remind you that help menus are available.

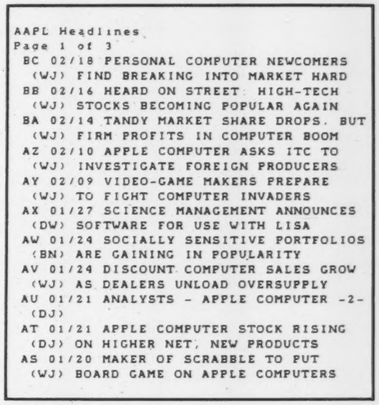
Selecting item 1 (or 2 or 3) of the Main Menu causes the program to dial the local area network automatically (if you customized the program for autodial). The monitor screen identifies each step of the dialing and log on procedure on the screen. Successful log on of the news retrieval mode results in a formatted screen and a request for the Dow Jones symbol of the company for which you want to review the news. The symbols are found in the Fact Finder provided with the program documentation.

If you type AAPL, the symbol for Apple Computer, Inc., the screen then inquires whether you want the latest story or a list of headlines for all the stories in the data bank. The list of headlines may be several pages long. Figure 2 shows what one page of headlines looks like. The two-letter symbols preceding each story are the story identifiers. At this point you can page forward or backward using the left and right arrow keys, obtain a help screen by typing "?," or obtain a story by typing the appropriate two-letter headline code. Figure 3 is an excerpt from one story.

It is that simple to retrieve and have access to thousands of stories in seconds. The news database is updated within 90 seconds of the time that the news appears on the broad tape in your broker's office and is retained in the database for 90 days.

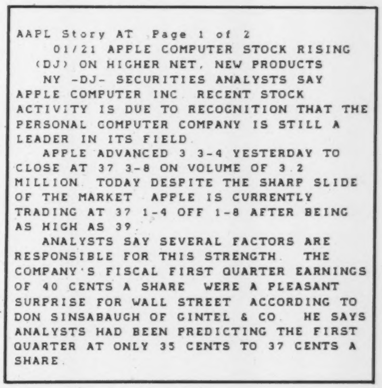
Quote Service

To reach another segment of the database, press ESCAPE several times until you get back to the main menu. (Figure 1). Proceeding to the Quote Service you get another formatted screen. Three inputs are required to obtain a price quote: the symbol of the security (from the Fact Finder); the security type (stock, preferred stock, warrant, when issued, corporate bonds, mutual funds, options, and Treasury bonds and notes); and the exchange or market where security is traded. The left and right arrows here serve two functions: to correct



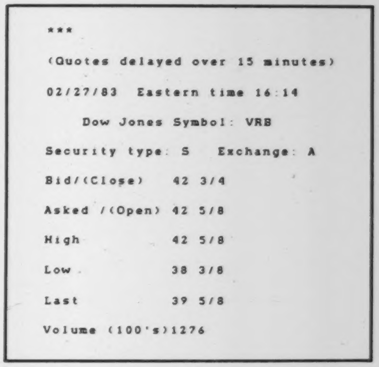
```
AAPL Headlines
Page 1 of 3
 BC 02/18 PERSONAL COMPUTER NEWCOMERS
  (WJ) FIND BREAKING INTO MARKET HARD
 BB 02/16 HEARD ON STREET: HIGH-TECH
  (WJ) STOCKS BECOMING POPULAR AGAIN
 BA 02/14 TANDY MARKET SHARE DROPS, BUT
  (WJ) FIRM PROFITS IN COMPUTER BOOM
 AZ 02/10 APPLE COMPUTER ASKS ITC TO
  (WJ) INVESTIGATE FOREIGN PRODUCERS
 AY 02/09 VIDEO-GAME MAKERS PREPARE
  (WJ) TO FIGHT COMPUTER INVADERS
 AX 01/27 SCIENCE MANAGEMENT ANNOUNCES
  (DW) SOFTWARE FOR USE WITH LISA
 AW 01/24 SOCIALLY SENSITIVE PORTFOLIOS
  (BN) ARE GAINING IN POPULARITY
 AV 01/24 DISCOUNT COMPUTER SALES GROW
  (WJ) AS DEALERS UNLOAD OVERSUPPLY
 AU 01/21 ANALYSTS - APPLE COMPUTER -2-
  (DJ)
 AT 01/21 APPLE COMPUTER STOCK RISING
  (DJ) ON HIGHER NET, NEW PRODUCTS
 AS 01/20 MAKER OF SCRABBLE TO PUT
  (WJ) BOARD GAME ON APPLE COMPUTERS
```

Figure 2.



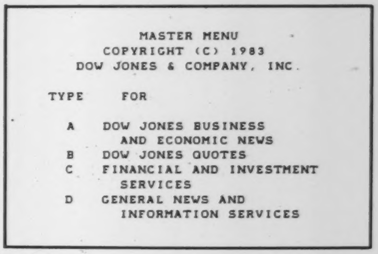
```
AAPL Story AT  Page 1 of 2
    01/21 APPLE COMPUTER STOCK RISING
  (DJ) ON HIGHER NET, NEW PRODUCTS
   NY -DJ- SECURITIES ANALYSTS SAY
APPLE COMPUTER INC. RECENT STOCK
ACTIVITY IS DUE TO RECOGNITION THAT THE
PERSONAL COMPUTER COMPANY IS STILL A
LEADER IN ITS FIELD.
   APPLE ADVANCED 3 3-4 YESTERDAY TO
CLOSE AT 37 3-8 ON VOLUME OF 3.2
MILLION. TODAY DESPITE THE SHARP SLIDE
OF THE MARKET, APPLE IS CURRENTLY
TRADING AT 37 1-4 OFF 1-8 AFTER BEING
AS HIGH AS 39.
   ANALYSTS SAY SEVERAL FACTORS ARE
RESPONSIBLE FOR THIS STRENGTH.  THE
COMPANY'S FISCAL FIRST QUARTER EARNINGS
OF 40 CENTS A SHARE  WERE A PLEASANT
SURPRISE FOR WALL STREET  ACCORDING TO
DON SINSABAUGH OF GINTEL & CO.  HE SAYS
ANALYSTS HAD BEEN PREDICTING THE FIRST
QUARTER AT ONLY 35 CENTS TO 37 CENTS A
SHARE.
```

Figure 3.



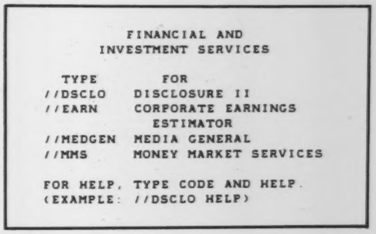
```
***

(Quotes delayed over 15 minutes)

02/27/83  Eastern time 16:14

    Dow Jones Symbol: VRB

Security type: S   Exchange: A

Bid/(Close)    42 3/4

Asked /(Open) 42 5/8

High           42 5/8

Low            38 3/8

Last           39 5/8

Volume (100's)1276
```

Figure 4.



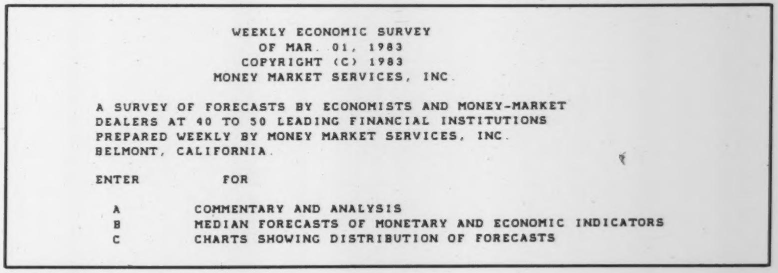
```
          MASTER MENU
       COPYRIGHT (C) 1983
  DOW JONES & COMPANY, INC.

TYPE     FOR

  A    DOW JONES BUSINESS
         AND ECONOMIC NEWS
  B    DOW JONES QUOTES
  C    FINANCIAL AND INVESTMENT
         SERVICES
  D    GENERAL NEWS AND
         INFORMATION SERVICES
```

Figure 5.



```
          FINANCIAL AND
      INVESTMENT SERVICES

  TYPE        FOR
//DSCLO    DISCLOSURE II
//EARN     CORPORATE EARNINGS
              ESTIMATOR
//MEDGEN   MEDIA GENERAL
//MMS      MONEY MARKET SERVICES

FOR HELP, TYPE CODE AND HELP.
(EXAMPLE: //DSCLO HELP)
```

Figure 6.



```
                  WEEKLY ECONOMIC SURVEY
                    OF MAR. 01, 1983
                   COPYRIGHT (C) 1983
               MONEY MARKET SERVICES, INC.

A SURVEY OF FORECASTS BY ECONOMISTS AND MONEY-MARKET
DEALERS AT 40 TO 50 LEADING FINANCIAL INSTITUTIONS
PREPARED WEEKLY BY MONEY MARKET SERVICES, INC.
BELMONT, CALIFORNIA.

ENTER          FOR

  A          COMMENTARY AND ANALYSIS
  B          MEDIAN FORECASTS OF MONETARY AND ECONOMIC INDICATORS
  C          CHARTS SHOWING DISTRIBUTION OF FORECASTS
```

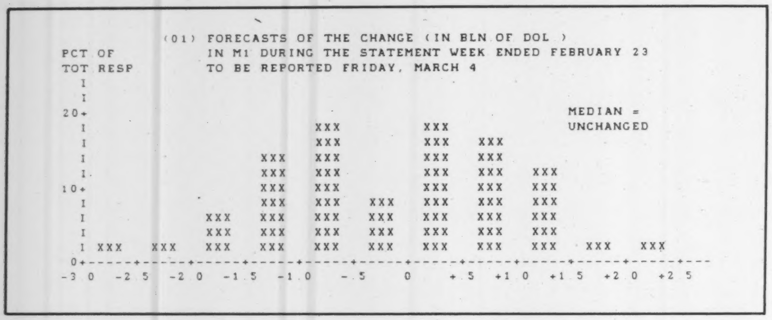
Figure 7.

typing errors and to move the cursor around the screen. Figure 4 shows what a completed quote retrieval looks like. During market hours, quotes are delayed 15 minutes, so you can obtain fairly current quotes during market hours if you like. Remember, prime time (day) access to the database is much more expensive than off hours (night) access. If you must have quotes during market hours there are services that could be cheaper ($150 to $200 per month), depending on how much you use the system. The News and Quote Retrieval segments are both straightforward and easy to use.

Additional Information Services

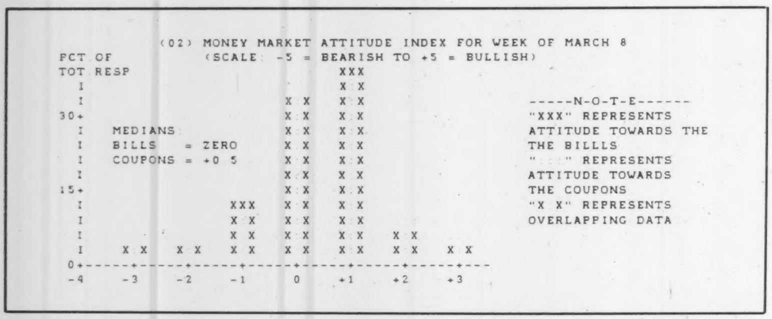
The Additional Information Services segment of the database is a little more involved because of the variety and depth of information available. When this segment of the database is selected from the main menu (Figure 1) of the program, the program automatically enters the simple terminal mode. In this mode, the user can access new database segments as they are brought on line by Dow Jones & Co. The inclusion of a simple terminal mode in the program is a good idea and shows some foresight. Entering the Additional Services segment brings up the Dow Jones Master Menu (Figure 5). The first time you use this segment it is a good idea to print out the various help menus as you go along so you will have them for reference whenever you use the system. This procedure will save you time (on line) and money when you access the database.

Proceeding through several of the many possible sections of the database provides a good sampling of the service and the information that is available. Typing C from the Master Menu (Figure 5) gets you into the Financial and Investment Services menu (Figure 6). Moving into the Money Market services menu (Figure 7) you can get commentaries, analyses, forecasts, and charts of forecasts. The charts are shown in Figures 8 and 9. Note that some of the information is provided in 80-column format and is printed as such. Forty-col-



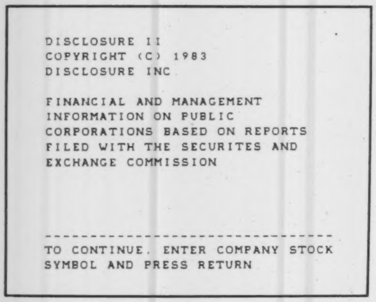
```
           (01) FORECASTS OF THE CHANGE (IN BLN OF DOL )
PCT OF          IN M1 DURING THE STATEMENT WEEK ENDED FEBRUARY 23
TOT RESP        TO BE REPORTED FRIDAY, MARCH 4
  I
  I
20+                                                     MEDIAN =
  I                         XXX         XXX             UNCHANGED
  I                         XXX         XXX   XXX
  I                   XXX   XXX         XXX   XXX
  I.                  XXX   XXX         XXX   XXX   XXX
10+                   XXX   XXX         XXX   XXX   XXX
  I                   XXX   XXX   XXX   XXX   XXX   XXX
  I             XXX   XXX   XXX   XXX   XXX   XXX   XXX
  I             XXX   XXX   XXX   XXX   XXX   XXX   XXX
  I XXX   XXX   XXX   XXX   XXX   XXX   XXX   XXX   XXX   XXX   XXX
 0+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
-3.0  -2.5  -2.0  -1.5  -1.0   -.5    0    +.5  +1.0  +1.5  +2.0  +2.5
```

Figure 8.



```
           (02) MONEY MARKET ATTITUDE INDEX FOR WEEK OF MARCH 8
PCT OF          (SCALE: -5 = BEARISH TO +5 = BULLISH)
TOT RESP                       XXX
  I                            X X
  I                      X X   X X                  -----N-O-T-E------
30+                      X X   X X                  "XXX" REPRESENTS
  I   MEDIANS            X X   X X                  ATTITUDE TOWARDS THE
  I   BILLS   = ZERO     X X   X X                  THE BILLLS
  I   COUPONS = +0.5     X X   X X                  " : " REPRESENTS
  I                      X X   X X                  ATTITUDE TOWARDS
15+                      X X   X X                  THE COUPONS
  I                XXX   X X   X X                  "X X" REPRESENTS
  I                X X   X X   X X                  OVERLAPPING DATA
  I                X X   X X   X X   X X
  I    X X   X X   X X   X X   X X   X X   X X
 0+-----+-----+-----+-----+-----+-----+-----+---
 -4     -3   -2    -1     0    +1    +2    +3
```

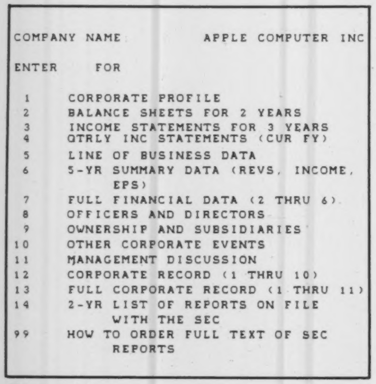
Figure 9.



```
DISCLOSURE II
COPYRIGHT (C) 1983
DISCLOSURE INC

FINANCIAL AND MANAGEMENT
INFORMATION ON PUBLIC
CORPORATIONS BASED ON REPORTS
FILED WITH THE SECURITES AND
EXCHANGE COMMISSION



---------------------------------
TO CONTINUE, ENTER COMPANY STOCK
SYMBOL AND PRESS RETURN
```

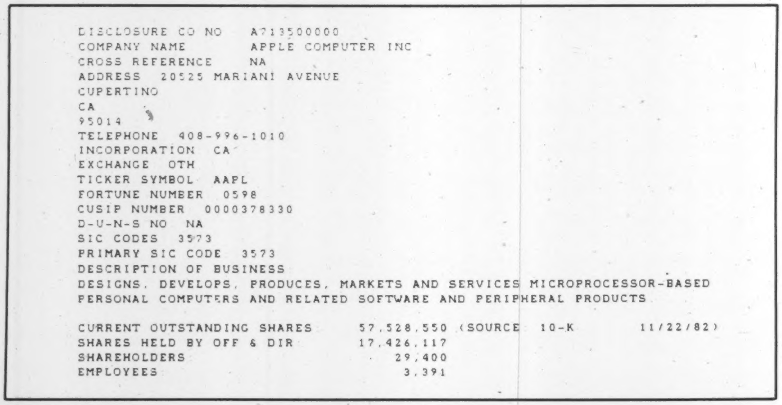
Figure 10.

The News and Quote Retrieval segments are straightforward and easy to use.



```
COMPANY NAME          APPLE COMPUTER INC

ENTER    FOR

 1    CORPORATE PROFILE
 2    BALANCE SHEETS FOR 2 YEARS
 3    INCOME STATEMENTS FOR 3 YEARS
 4    QTRLY INC STATEMENTS (CUR FY)
 5    LINE OF BUSINESS DATA
 6    5-YR SUMMARY DATA (REVS, INCOME,
          EPS)
 7    FULL FINANCIAL DATA (2 THRU 6)
 8    OFFICERS AND DIRECTORS
 9    OWNERSHIP AND SUBSIDIARIES
10    OTHER CORPORATE EVENTS
11    MANAGEMENT DISCUSSION
12    CORPORATE RECORD (1 THRU 10)
13    FULL CORPORATE RECORD (1 THRU 11)
14    2-YR LIST OF REPORTS ON FILE
          WITH THE SEC
99    HOW TO ORDER FULL TEXT OF SEC
          REPORTS
```

Figure 11.



```
DISCLOSURE CO NO    A713500000
COMPANY NAME        APPLE COMPUTER INC
CROSS REFERENCE     NA
ADDRESS  20525 MARIANI AVENUE
CUPERTINO
CA
95014
TELEPHONE  408-996-1010
INCORPORATION  CA
EXCHANGE  OTH
TICKER SYMBOL  AAPL
FORTUNE NUMBER  0598
CUSIP NUMBER  0000378330
D-U-N-S NO  NA
SIC CODES  3573
PRIMARY SIC CODE  3573
DESCRIPTION OF BUSINESS
DESIGNS, DEVELOPS, PRODUCES, MARKETS AND SERVICES MICROPROCESSOR-BASED
PERSONAL COMPUTERS AND RELATED SOFTWARE AND PERIPHERAL PRODUCTS

CURRENT OUTSTANDING SHARES      57,528,550 (SOURCE: 10-K        11/22/82)
SHARES HELD BY OFF & DIR        17,426,117
SHAREHOLDERS                        29,400
EMPLOYEES                            3,391
```

Figure 12.

umn screens use wrap-around, i.e., the 41st through 80th character on each line are presented on the next line on the monitor.

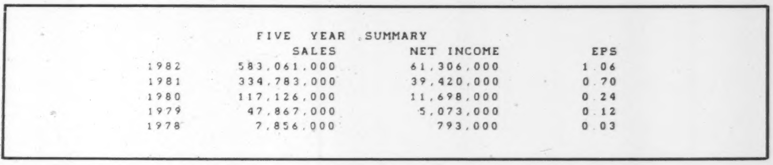
If you chose the Disclosure II option you would obtain Figure 10. For Apple Computer, the available information appears in Figure 11; this is the same information found in a company's 10-K report. Selecting #1 Corporate Profile you get Figure 12. A five-year data summary, #6, is shown in Figure 13. If you are interested in obtaining earnings forecasts, you can obtain consensus forecasts using the corporate earnings estimator (menu Figure 6) to obtain estimates for any company in the database, in this case Apple, (Figures 14, 15, and 16).

Figure 17 shows the Media General-Financial database. Skipping past some preliminary instructions, you obtain the information shown in Figures 18 through 23, which are self-explanatory.

Summary

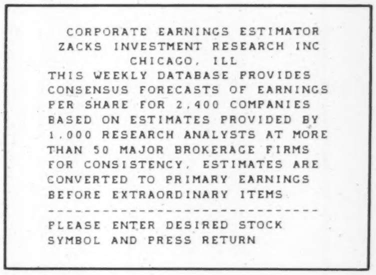
It is clear from excerpts presented in this article that an enormous amount of financial information is available—not only financial news, but shop at home service, stock market pointers, customer information, and more (Figure 24). Apple's *Dow Jones News & Quotes Reporter* makes retrieval of this information a snap. The program is extremely easy to use and very well error trapped.

The major fault that I find in the program is that there is no provision to store the retrieved data on disk. The data retrieved can be viewed only on the monitor or printed on paper. It is a shame that the program lacks a disk storage feature. The kinds of data available in some segments of the database are the kinds of data needed for fundamental analysis of securities. The ability to store this data electronically for manipulation at a later time would be a very valuable feature. The lack of disk data storage detracts from what I consider to be an otherwise outstanding and useful program. □



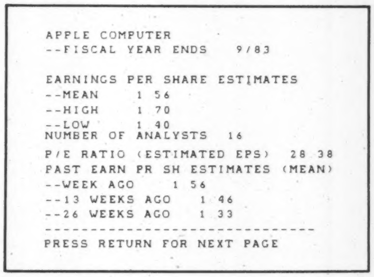
```
                         FIVE  YEAR  SUMMARY
                             SALES           NET INCOME          EPS
           1982        583,061,000          61,306,000          1.06
           1981        334,783,000          39,420,000          0.70
           1980        117,126,000          11,698,000          0.24
           1979         47,867,000           5,073,000          0.12
           1978          7,856,000             793,000          0.03
```

Figure 13.



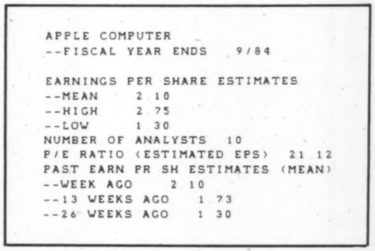
```
  CORPORATE EARNINGS ESTIMATOR
 ZACKS INVESTMENT RESEARCH INC
         CHICAGO, ILL
THIS WEEKLY DATABASE PROVIDES
CONSENSUS FORECASTS OF EARNINGS
PER SHARE FOR 2,400 COMPANIES
BASED ON ESTIMATES PROVIDED BY
1,000 RESEARCH ANALYSTS AT MORE
THAN 50 MAJOR BROKERAGE FIRMS
FOR CONSISTENCY, ESTIMATES ARE
CONVERTED TO PRIMARY EARNINGS
BEFORE EXTRAORDINARY ITEMS
------------------------------
PLEASE ENTER DESIRED STOCK
SYMBOL AND PRESS RETURN
```

Figure 14.



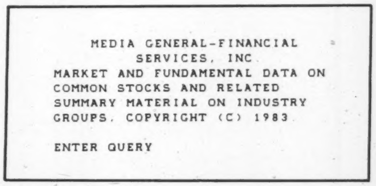
```
APPLE COMPUTER
--FISCAL YEAR ENDS   9/83

EARNINGS PER SHARE ESTIMATES
--MEAN     1.56
--HIGH     1.70
--LOW      1.40
NUMBER OF ANALYSTS  16
P/E RATIO (ESTIMATED EPS)  28.38
PAST EARN PR SH ESTIMATES (MEAN)
--WEEK AGO     1.56
--13 WEEKS AGO   1.46
--26 WEEKS AGO   1.33
------------------------------
PRESS RETURN FOR NEXT PAGE
```

Figure 15.



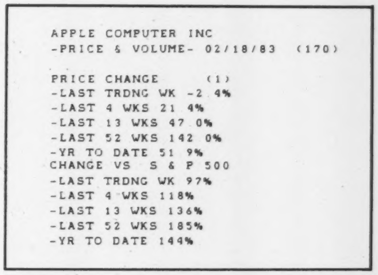
```
APPLE COMPUTER
--FISCAL YEAR ENDS   9/84

EARNINGS PER SHARE ESTIMATES
--MEAN     2.10
--HIGH     2.75
--LOW      1.30
NUMBER OF ANALYSTS  10
P/E RATIO (ESTIMATED EPS)  21.12
PAST EARN PR SH ESTIMATES (MEAN)
--WEEK AGO     2.10
--13 WEEKS AGO   1.73
--26 WEEKS AGO   1.30
```

Figure 16.



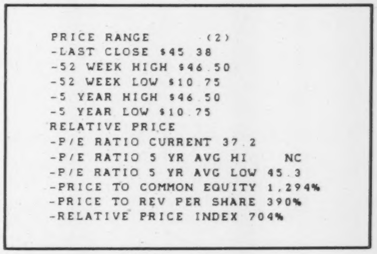
```
      MEDIA GENERAL-FINANCIAL
           SERVICES, INC
MARKET AND FUNDAMENTAL DATA ON
COMMON STOCKS AND RELATED
SUMMARY MATERIAL ON INDUSTRY
GROUPS, COPYRIGHT (C) 1983

ENTER QUERY
```

Figure 17.



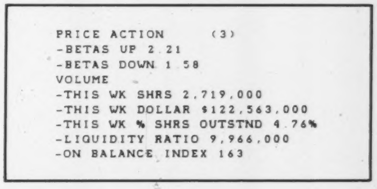
```
APPLE COMPUTER INC
-PRICE & VOLUME- 02/18/83  (170)

PRICE CHANGE       (1)
-LAST TRDNG WK -2.4%
-LAST 4 WKS 21.4%
-LAST 13 WKS 47.0%
-LAST 52 WKS 142.0%
-YR TO DATE 51.9%
CHANGE VS  S & P 500
-LAST TRDNG WK 97%
-LAST 4 WKS 118%
-LAST 13 WKS 136%
-LAST 52 WKS 185%
-YR TO DATE 144%
```

Figure 18.



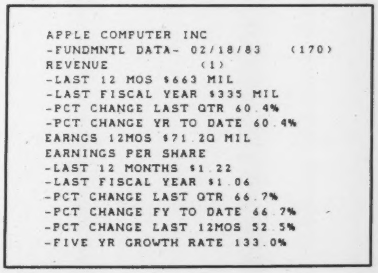
```
PRICE RANGE        (2)
-LAST CLOSE $45.38
-52 WEEK HIGH $46.50
-52 WEEK LOW $10.75
-5 YEAR HIGH $46.50
-5 YEAR LOW $10.75
RELATIVE PRICE
-P/E RATIO CURRENT 37.2
-P/E RATIO 5 YR AVG HI     NC
-P/E RATIO 5 YR AVG LOW 45.3
-PRICE TO COMMON EQUITY 1,294%
-PRICE TO REV PER SHARE 390%
-RELATIVE PRICE INDEX 704%
```

Figure 19.



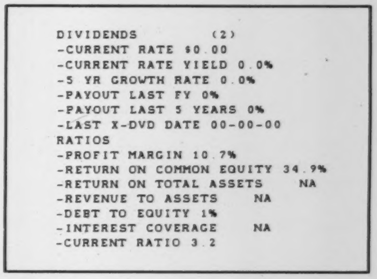
```
PRICE ACTION       (3)
-BETAS UP 2.21
-BETAS DOWN 1.58
VOLUME
-THIS WK SHRS 2,719,000
-THIS WK DOLLAR $122,563,000
-THIS WK % SHRS OUTSTND 4.76%
-LIQUIDITY RATIO 9,966,000
-ON BALANCE INDEX 163
```

Figure 20.



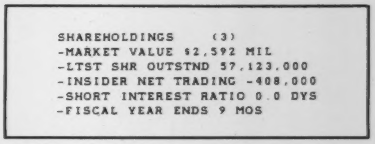
```
APPLE COMPUTER INC
-FUNDMNTL DATA- 02/18/83   (170)
REVENUE            (1)
-LAST 12 MOS $663 MIL
-LAST FISCAL YEAR $335 MIL
-PCT CHANGE LAST QTR 60.4%
-PCT CHANGE YR TO DATE 60.4%
EARNGS 12MOS $71.2Q MIL
EARNINGS PER SHARE
-LAST 12 MONTHS $1.22
-LAST FISCAL YEAR $1.06
-PCT CHANGE LAST QTR 66.7%
-PCT CHANGE FY TO DATE 66.7%
-PCT CHANGE LAST 12MOS 52.5%
-FIVE YR GROWTH RATE 133.0%
```

Figure 21.



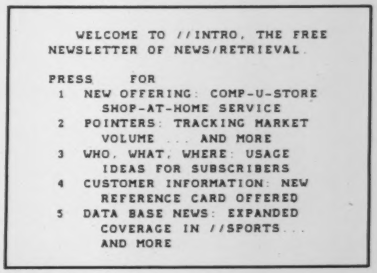
```
DIVIDENDS          (2)
-CURRENT RATE $0.00
-CURRENT RATE YIELD 0.0%
-5 YR GROWTH RATE 0.0%
-PAYOUT LAST FY 0%
-PAYOUT LAST 5 YEARS 0%
-LAST X-DVD DATE 00-00-00
RATIOS
-PROFIT MARGIN 10.7%
-RETURN ON COMMON EQUITY 34.9%
-RETURN ON TOTAL ASSETS    NA
-REVENUE TO ASSETS    NA
-DEBT TO EQUITY 1%
-INTEREST COVERAGE    NA
-CURRENT RATIO 3.2
```

Figure 22.



```
SHAREHOLDINGS    (3)
-MARKET VALUE $2,592 MIL
-LTST SHR OUTSTND 57,123,000
-INSIDER NET TRADING -408,000
-SHORT INTEREST RATIO 0.0 DYS
-FISCAL YEAR ENDS 9 MOS
```

Figure 23.



```
   WELCOME TO //INTRO, THE FREE
NEWSLETTER OF NEWS/RETRIEVAL.

PRESS    FOR
 1  NEW OFFERING: COMP-U-STORE
      SHOP-AT-HOME SERVICE
 2  POINTERS: TRACKING MARKET
      VOLUME ... AND MORE
 3  WHO, WHAT, WHERE: USAGE
      IDEAS FOR SUBSCRIBERS
 4  CUSTOMER INFORMATION: NEW
      REFERENCE CARD OFFERED
 5  DATA BASE NEWS: EXPANDED
      COVERAGE IN //SPORTS...
      AND MORE
```

Figure 24.

The Choice of

SAVE
THIS AD
IT IS YOUR
CATALOG
AND CHANGES MONTHLY

Conroy-LaPointe — The Supply Center for the IBM-PC or XT

SOFTWARE for the IBM-PC or XT

BUSINESS

			LIST PRICE	OUR PRICE
ASHTON-TATE, dBase II, requires CP/M-86 & 128K			$ 700	$399
dBase II, requires PC-DOS & 128K			$ 700	$399
The Financial Planner		NEW!	$ 700	$399
dBase II User's Guide by Software Banc			$ 30	$ 20
Everyman's DB Primer (Book)		NEW!	$ 15	$ 12
Friday		NEW!	$ 295	$199
APPLIED SOFTWARE TECHNOLOGY, Versaform			$ 389	$265
CONTINENTAL, The Home Accountant Plus			$ 150	$112
FCM (Filing, Cataloging, Mailing)			$ 125	$ 85
Property Management			$ 495	$329
DATAMOST, Real Estate Investment Program		NEW!	$ 130	$ 89
Write-On (Word Processor Program)			$ 130	$ 89
DIGITAL RESEARCH, Concurrent CP M-86™			$ 350	$235
CBASIC 86™			$ 200	$135
CP M86			$ 60	$ 40
DOW JONES, Dow Jones Market Manager			$ 300	$239
EAGLE SOFTWARE, Money Decisions		NEW!	$ 150	$129
FOX & GELLER, Quickcode (MSDOS)			$ 295	$195
dGraph (MSDOS, requires color graphics adaptor)			$ 295	$215
HAYDEN, IBM Pie Writer		NEW!	$ 200	$135
HOWARDSOFT, Real Estate Analyzer II			$ 250	$189
INFORMATION UNLIMITED, EasyWriter II (Word Processor)			$ 350	$259
EasySpeller II (88K Words)			$ 225	$149
EasyFiler (a DBMS)			$ 400	$299
INNOVATIVE SOFTWARE, T I M III (a DBMS)			$ 495	$329
★ **INSOFT**, Data Design (a powerful easy to use DBMS)		NEW!	$ 225	$169
Data Base Made Easy (Book)		NEW!	$ 17	$ 12
★ **LOTUS**, 1-2-3		NEW!	$ 495	$329
MICROCRAFT, Verdict (Legal) or Billkeeper, each (CP/M86)			$ 995	$469
MICROPRO, WordStar® plus free WordStar Training Manual			$ 495	$269
Mail Merge™ (Call on 2 Pak, 3 Pak and others)			$ 250	$129
SpellStar™			$ 250	$129
★ WordStar Professional, 4 Pak, 3 above + StarIndex			$ 895	$429
StarIndex™		NEW!	$ 195	$109
InfoStar™			$ 495	$269
Report Star™			$ 350	$199
★ **MICROSOFT**, Multiplan	MSDOS		$ 275	$189
Multitool Word	MSDOS	NEW!	$ 375	$275
Multitool Word with Mouse	MSDOS	NEW!	$ 475	$350
Multitool, Financial Statement	MSDOS	NEW!	$ 100	$ 75
Multitool, Budget	MSDOS	NEW!	$ 150	$115
muLisp/muStar		NEW!	$ 250	$185
muMath/muSimp		NEW!	$ 300	$225
Business BASIC Compiler	MSDOS	NEW!	$ 600	$450
Pascal Compiler	MSDOS	NEW!	$ 350	$260
C Compiler	MSDOS	NEW!	$ 500	$375
BASIC Compiler	MSDOS	NEW!	$ 395	$295
Fortran Compiler	MSDOS	NEW!	$ 350	$259
COBOL Compiler	MSDOS	NEW!	$ 750	$559
BASIC Interpreter	MSDOS	NEW!	$ 350	$259
MULTISOFT, StretchCalc (makes a close Lotus out of Visicalc)			$ 99	$ 59
NORTH AMERICAN BUS SYSTEM, The Answer			$ 250	$169
OSBORNE/COMX, (Book & Disk: Business, Statistics & Math Programs)				
Some Common Basic Programs (70 programs)			$ 100	$ 69
Practical Basic Programs (40 more programs)			$ 100	$ 69
PBL CORPORATION, Personal Investor			$ 145	$ 99
PEACHTREE SOFTWARE, Peach Pak 4 (GL, AR & AP)			$ 595	$365
PERFECT SOFTWARE, Perfect Writer™			$ 389	$219
Perfect Speller™ or Perfect Calc™, each			$ 295	$129
Perfect Filer™			$ 595	$259
ROIZEN, T/Maker III			$ 295	$219
SOFTWARE PUBLISHING, PFS: File		NEW!	$ 140	$ 95
PFS: Report		NEW!	$ 125	$ 85
SORCIM/ISA, SuperCalc II			$ 295	$199
SuperWriter			$ 395	$269
Spellguard			$ 195	$129
STC, The Creator			$ 300	$195
SYNAPSE, File Manager			$ 150	$ 99
SYNERGISTIC, Data Reporter			$ 250	$169
★ **VISICORP**, VisiCalc®/256K			$ 250	$179
VisiDex or VisiSchedule, each			$ 250	$199
VisiTrend/Plot			$ 300	$219
VisiFile or Desktop Plan I, each			$ 300	$239

UTILITY

★ **CENTRAL POINT**, Copy II PC. Backup and Utility	NEW!	$ 40	$ 35
★ **COMX**, Fastrak™, RAM/Disk emulator and printer spooler program. Works on any PC DOS version or RAM Card. Menu Driven.	NEW!	$ 100	$ 59
HAYES, Smartcom II		$ 119	$ 89
MICROCOM, Microterminal		$ 100	$ 65
MICROSTUF, Crosstalk		$ 195	$129
NAGY SYSTEMS, Copy PC Backup and Utilities		$ 35	$ 25
NORELL DATA, System Backup		$ 50	$ 39
NORTON, Norton Utilities. 14 powerful programs, 3 disks		$ 80	$ 65

HOME & EDUCATIONAL

EPYX/Automated Simulations, Temple of Apshai		$ 40	$ 29
Oil Barons	NEW!	$ 100	$ 75
★ **ARMONK**, Executive Suite		$ 40	$ 27
BLUE CHIP, Millionaire		$ 60	$ 39
BPI SYSTEMS, Personal Accounting		$ 195	$139
★ **BRODERBUND**, Apple Panic		$ 30	$ 22
CONTINENTAL, the Home Accountant Plus		$ 150	$112
DATAMOST, Pig Pen or Space Strike, each		$ 30	$ 22
DAVIDSON, The Speed Reader II		$ 75	$ 55
INFOCOM, Deadline		$ 50	$ 39
Zork I or Zork II or Zork III, each		$ 40	$ 29
★ **INSOFT**, Word Trix or Quotrix or Mystrix, each	NEW!	$ 35	$ 29
MICROSOFT, Flight Simulator (by Sub-Logic)	NEW!	$ 50	$ 35
PBL CORP., Personal Investor		$ 145	$ 99
SIR-TECH, Wizardry, Scenario #1		$ 60	40
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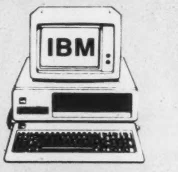

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★ 13" Color III, RGB, Commercial (Ap. II, III)	$ 479	$ 399
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Smartmodem 1200 (RS-232)	$ 699	$ 535
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212 AppleCat 1200 BAUD	$ 725	$ 599
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SSM, Transcend 1 for Apple II Data Comm	$ 89	$ 69
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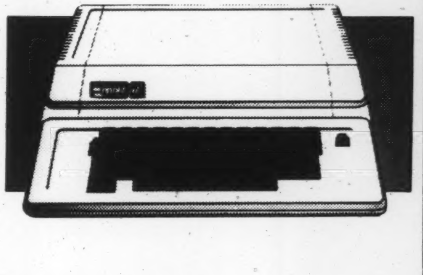

APPLE IIe 64K, 40 COLUMN	**$1,175**
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WARRANTY: Limited warranty is 100% Parts & Labor for 90 days by us.

To substitute or delete drive on System B, subtract $245 and add drive price. (System D)

To add one Micro-Sci A2 Drive to above, add $245. (System DD)

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for Apple II

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★ **ALS**. ADDRam (II+) 16K	$ 100	$ 69
★ **Microsoft**. RAMCard (II+) 16K	$ 100	$ 79
★ **Saturn Systems**. RAM Card (II+) 32K	$ 249	$169
RAM Card (II+) 64K	$ 425	$319
RAM Card (II+) 128K	$ 599	$459
★ **Axlon RAM Disk System** (+ or e) 320K	$1395	$795

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★ **ComX**, 16K RAM Card, 2 Yr. Warranty, for II+	$ 179	$ 39
MicroCom, Micro Courier	$ 250	$ 99
Micro Telegram	$ 250	$ 99
Microsoft, 16K RAMCard for II+	$ 100	$ 79
Saturn Systems, 32K RAM Card for II+	$ 249	$169
Silicon Valley, Word Handler	$ 250	$139
Videx, Videoterm, 80 column card for II+	$ 345	$229

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Note: Substitutions and deletions same as System B apply. Syscom 2 is software and hardware compatible to the Apple II+.

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An almost complete word processor

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SOFTWARE PROFILE

Name: AtariWriter
Type: Word processor
System: 16K Atari 400/800/1200
Format: Cartridge
Language: Machine language
Summary: A nicely packaged and usable word processor.
Price: $99.95
Manufacturer:
Atari, Inc.
1265 Borregas Ave.
Sunnyvale, CA 94086

It seems that every time you turn around there is another word processor program for the Atari computer. The latest entry in the word processing sweepstakes, *AtariWriter,* comes from none other than Atari itself. This cartridge-based program is unique in that it allows text files to be saved on cassette tapes, opening up the world of word processing to the Atari user without a disk drive. This feature, together with its ease of use, makes *AtariWriter* a candidate for "Best Atari Product in a Long Time."

An easy to use program is one that may be used immediately after removing it from its package. *AtariWriter* is such a program as evidenced by my beginning to type this review only moments after opening the box. Turn on the computer (400, 800, or 1200), pop in the cartridge and select the Create option from the menu when it appears. You are now in the Create mode and may begin typing. Pressing the ESC key at any time brings back the main menu without losing any of your text contained in memory.

Time and errors can also be minimized by using the Search and Replace functions.

If *AtariWriter* is used with a disk drive, the Atari 810 Master Disk (or any disk containing DOS 2.0S files) must be inserted into the drive before powering up the computer. Otherwise, the Atari 410 Program Recorder should be connected prior to inserting the cartridge and applying power.

Unlike the *Atari Word Processor* (Atari's previous word processing program) the menu that appears at power up is the only menu used in the program. The activities that may be performed with the word processor are listed alphabetically. Menu selections are made by entering the first letter of the command (displayed in reverse video). The program then asks what you want to do next.

The Create File option is used to start writing a new text file. If a text file already exists in memory, *AtariWriter* asks if you want it erased. This type of fail safe message appears throughout the program whenever there is a possibility that you may inadvertently delete or erase some text.

Editing

The Edit File option of the main menu allows revisions to be made to a text file already in memory. It is usually used after loading, saving, or printing a text file. The editing functions are available only in this mode and are particularly easy to use. The cursor (a blinking underline) is moved through the text one character at a time by means of the CTRL key plus one of the four arrow keys. The OPTION key plus the up or down arrow key moves up or down one screen at a time.

Most of the text manipulation and formatting commands are initiated by using the CTRL key or one of the Special Function keys in conjunction with another key. For example, to determine the amount of currently available memory in bytes, you would press OPTION-F. With 48K of memory and a disk drive,

---

Arthur Leyenberger, 40 Lawrence Rd., Parsippany, NJ 07054.

Can you tell the IBM® from the Transtar 130?

A

Letter quality
standard of
the industry

5x magnification

B

Letter quality
standard of
the industry

5x magnification

One of these two print samples was generated by an **IBM Selectric II:** the letter quality standard of the industry.

The other was generated by the new **Transtar 130** letter-quality printer.

And print quality is just the beginning! The new Transtar 130 daisy wheel printer is also plug-and-go compatible with the best-selling word processing packages! It features bidirectional printing, superscript, subscript, underlining and a true boldface. Retail price? **Only $895.**

Quietly producing copy at 18 cps Shannon text speed, the Transtar 130 also features a unique autoload button to make printing on letterheads a breeze! Three new daisy wheels have just been made available for the 130 from your dealer: letter gothic (shown), script, and a 15-pitch "gothic mini"—perfect for printing spreadsheets to fit on one page!

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Have you decided yet whose type is whose? If you picked A...You picked Transtar. The new standard for letter quality printing.

Transtar

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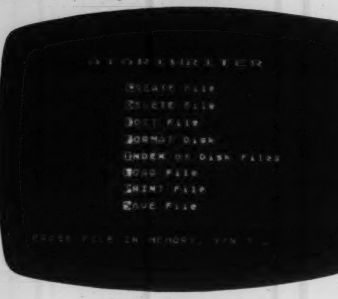
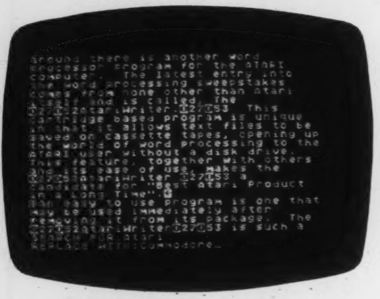
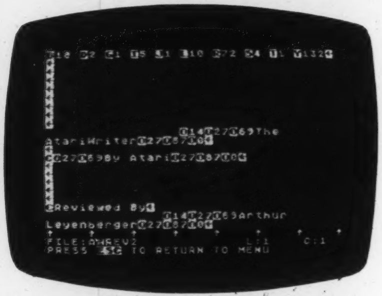
CIRCLE 221 ON READER SERVICE CARD



AtariWriter main menu.



Search and replace mode.



Text entry screen.

you start out with approximately 20K of memory available for text. This translates into about 16 double-spaced pages. Slightly more text memory is available if only a tape recorder is used.

Other straightforward commands are: CTRL-A, move cursor to beginning of line; CTRL-Z, move cursor to end of line SELECT-T, move cursor to top of file; SELECT-B, move cursor to bottom of file; SELECT-S, search and replace; CTRL-P, begin new paragraph; and CTRL-C, center text.

Blocks of text can be manipulated easily by placing a CTRL-X at the beginning and at the end of the block. The block may then be deleted, copied, or moved to another location. Copying and moving text are very powerful features, allowing you to duplicate or shift parts of the text file around without having to retype the material.

Time and errors can also be minimized by using the Search and Replace functions. For example, if I consistently misspelled the word Atari in this text file I could use these functions to locate and to correct each mistake quickly. The program gives me the choice of deciding whether to replace each occurrence individually or change all of them at once (globally).

Unfortunately, control characters may not be used with the Search and Replace functions. For example, whenever I use the word *AtariWriter* I use two printer control codes before and after the word to turn the italics font on and off on my printer. Control codes are inserted by preceding the decimal value of the printer code with a CTRL-O. With other word processors I have gotten into the habit of placing ## at the start of the word and a #$ at the end of the word to be italicized. When I am finished with the entire document I perform a global search and replace the ## and #$ with the corresponding printer codes.

When creating a new or editing an existing text file the bottom of the screen always displays the file name (if loaded from disk), the line and column position, and a message stating, Press ESC to Return to Menu. The default tab positions are indicated by arrows. The first line at the top of the text file is called the Print Formatting Block and displays the values used for formatting and printing. These settings include left, right, top, and bottom margins; spacing, lines per page and justification information; and paragraph indent and skip values. These values have default settings which you may change and save with the text file.

An interesting and useful function of AtariWriter is the ability to see on the screen what your printed document will eventually look like.

Menu selections for disk interaction include: disk formatting, displaying or printing a disk file index, and loading, saving, and deleting files. The Save File command has several useful features. If the text in memory is to be saved under the same name as is displayed at the bottom of the screen only the RETURN key need be pressed in response to the Filename? prompt. If a file by that name already exists on the disk, the user is asked if the existing file should be replaced. When returning to the Edit File mode, *Atari Writer* puts you back exactly where you left off.

Printing

An interesting and useful function of *AtariWriter* is the ability to see on the screen what your printed document will eventually look like. This is the Print Preview option that formats your text file, page by page, on the screen as it will print on paper. You then view your text one "page" at a time through a 36-character by 21-line window that may be scrolled vertically or horizontally through the page.

The final command on the menu is for printing. The first time a document is printed, you are asked to choose from the following list of printers: Atari 1025, Atari 825, Atari 820, and Atari 822. If you have a non-Atari printer, you must select the Atari 820. For the remainder of the session, the program remembers the printer that you have selected.

If you have a non-Atari printer, you will be unable to use the built-in printer control codes like CTRL-U for underlining and SELECT-E for elongated (double-width) printing. However, control codes may be inserted directly within the text by means of the CTRL-O command. In any case, the Print File command lets you start and finish at any page and get up to 99 copies of your document.

According to the manual, a printer driver will soon be available that will permit you to store a file on your data disk that will boot automatically when DOS is loaded. This file will contain the codes needed for underlining, super- and subscripting, and the printer fonts that your printer supports. This will allow you to use the features of your printer without inserting a series of complicated and lengthy control codes.

Originally, the Atari Program Exchange (APX) was to supply these printer drivers soon after *AtariWriter* was released. As of this writing, Atari does *not* plan to supply the printer drivers as promised. Once again, Atari refuses to acknowledge the existence of (or support) non-Atari products.

Summary

My overall impression of *AtariWriter* is positive. It has good error trapping, is very easy to use and understand, and can be used with the cassette recorder. Powerful features like file merging and chain printing are supported. The Print Preview function is a unique and useful method of overcoming the limitations of a 40-column screen.

Nevertheless, this word processor needs a printer driver. Without it, *AtariWriter* is only the best Atari product to be released in a long time. With a printer driver, *AtariWriter* will be the best Atari word processor for the majority of Atari computer owners. ☐

The Nation's Model Urban School District Prepares for the Future.

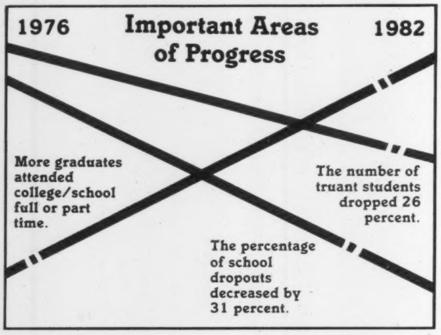
Radio Shack
TRS-80
COLOR COMPUTER

Duval County Public Schools Implement Radio Shack's TRS-80® Color Computer

The Blueprint for Academic Excellence

The Duval County Public Schools Receive Recognition for a Model Year

Amid the concern for public education in America, the Duval County public school district in Florida has been the recipient of many awards and substantial national recognition. Following a request from the U.S. Department of Education in 1982, the prestigious Danforth Foundation selected Duval County Public Schools as a national model urban school district. As a result, the Duval County school system has received nationwide recognition from the news media and educational organizations.



Attention Earned Through Achievement

For Duval County Public Schools, the Danforth award is a culmination of awards from various academic competitions. In addition to winning numerous state matches, Duval County won the second and third annual National Academic Super Bowls. And it was a Duval County public school that represented Florida in the U.S. Academic Decathlon, placing fifth among teams from 27 states and three foreign countries. Such achievement is also reflected on student test scores. On the State Student Assessment Test, scores have increased 47% in mathematics and 13% in communications between 1977 and 1982. On the nationally-normed Stanford Achievement Test (below), elementary students have scored above the national average for six straight years, senior high students for the past three years, and junior high students improved the most by reaching the national average last year.

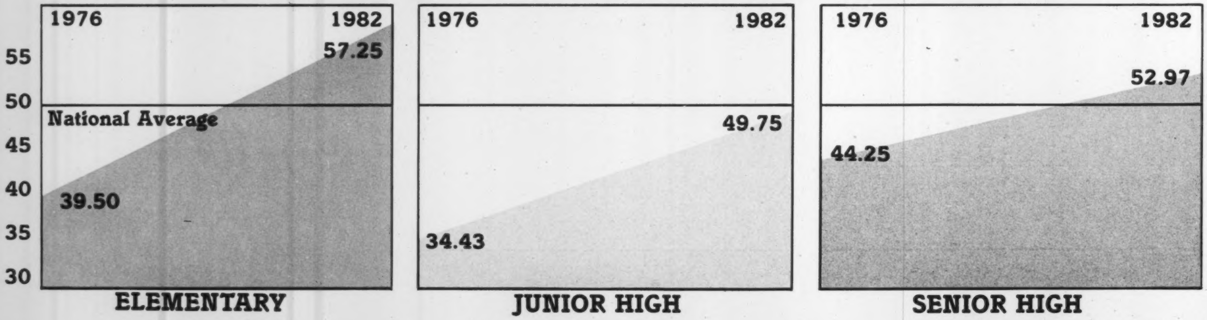
Determination to Improve Education

The Duval County Public Schools have not always been a model of success. In fact, as recently as six years ago, behavior problems and low test scores plagued the Duval County school system. Then a district-wide improvement program based on strict academic and disciplinary standards was implemented; and the change has been remarkable. Improvements include providing students with peer tutoring and special help sessions during lunch breaks, both before and after class, and for two hours on Saturday mornings. District-wide "theme" programs have also been implemented. In 1981, a "Courtesy is Contagious" campaign emphasized respectful student behavior toward teachers and fellow students. The traditional values of courtesy, respect and patriotism infected schools, students, staff members and the entire community. Last year a "Learn to Learn" program stressed the improvement of study skills and work habits. A Homework Hotline and a School-Based Homework Assistance program were implemented to encourage students to keep their books open after regular classroom hours.

Preparing Students for the Future

The Duval County Public Schools continue to upgrade the quality of education. To prepare students for the information age, the school system is implementing TRS-80 Color Computers in its classrooms.

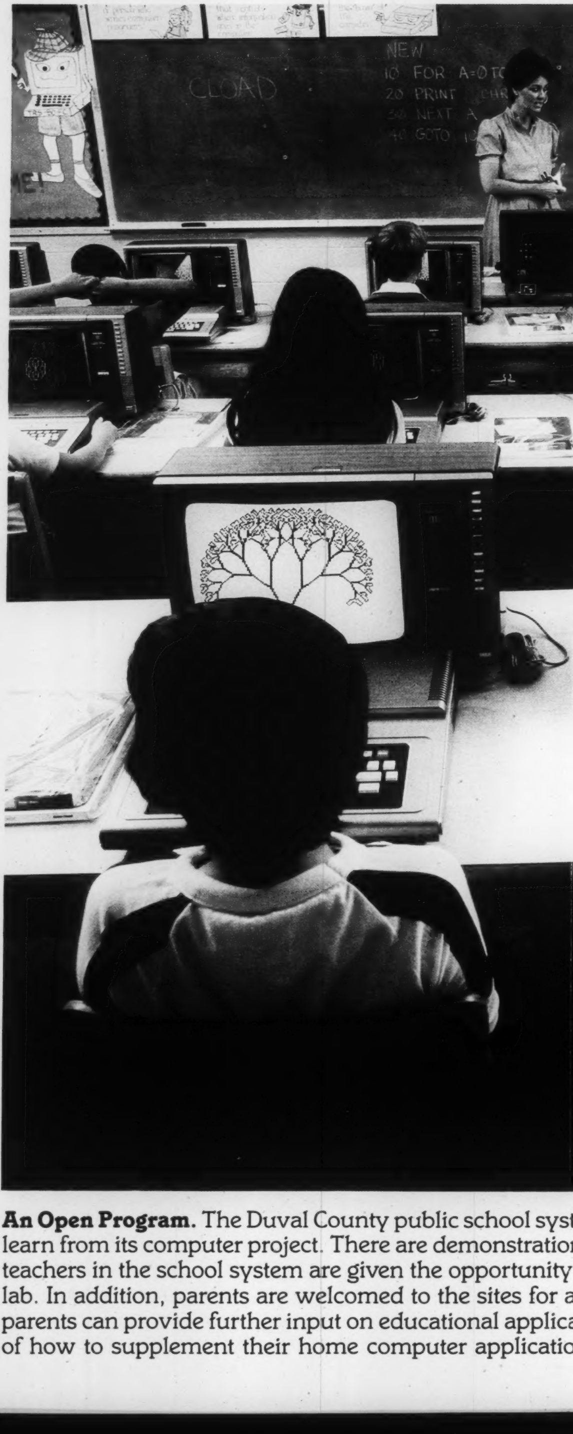
Stanford Achievement Test Countywide Mean Percentile Scores



Computers Ente
By Design, n

The Nod of Approval. To provide students with the best computer education possible, Duval County Public Schools performed an exhaustive review of various microcomputer manufacturers. In the end they chose Radio Shack. According to Superintendent Herb Sang, Radio Shack provided the Duval County schools with "quality computer products, full support, and prices we could afford."

Color Computer Labs. Duval County presently has Color Computer labs in 28 elementary schools. Each lab consists of 15 Color Computers joined in a cost-effective network. By the fall of 1984, computer labs will exist in all 96 Duval County elementary schools. In addition to the instructional use of the Color Computer, a TRS-80 Model 12 will be placed in each elementary school to be interfaced with the school district's Student Information Management System. This connection with the district's mainframe computer will permit the Duval schools to easily send and receive student information to the central data base. Records previously kept on paper can be stored, updated and retrieved electronically—which saves valuable time.



An Open Program. The Duval County public school syst
learn from its computer project. There are demonstration
teachers in the school system are given the opportunity
lab. In addition, parents are welcomed to the sites for a
parents can provide further input on educational applica
of how to supplement their home computer applicatio

er the Classroom not by Chance

```
NEW
5CLS(L)
10 PRINT "TYPE YOUR NAME. I WILL FILL
    THE SCREEN WITH IT."
20 INPUT N$
30 PRINT N$" ";
40 GOTO 30
50 END
```

RULES
Don't press "BREAK"
To load the Program
1 Type CLOAD on keyboard
2 Press ENTER key
EVERGREEN 5

ystem encourages teachers, parents and other school districts to
ion sites in each of its five administrative areas. All elementary
ty to receive in-service training in the operation of a computer
r a computer literacy training program. Through observation,
ications with the computer. They also can become more aware
tions with educational ones.

Pursuing Objectives Compatible with a New Age. Duval County Public Schools clearly see the importance of the computer in our everyday lives. It is the school system's purpose that students will have at least a basic understanding of the functions and uses of the computer, how it is programmed and what its impact is on society. In addition, students can develop their logic by utilizing the systematic processes required in programming. And through the use of Computer Assisted Instruction (CAI) courseware, students can develop other fundamental skills as well as acquire knowledge of various subjects.

Color LOGO Learning Lab. With the development of computer literacy as a major objective, the Duval County school system selected Color LOGO as the primary programming language for elementary computer study. Through manipulation of a "turtle" on the computer screen, young students learn to program, develop problem-solving skills, grasp graphic relationships and gain valuable insight into advanced mathematical, geometric, logical and programming concepts.

Members of The Team Behind Putting Computers In Front of Duval County Students

Jack Nooney, School Board Vice Chairman. "We must provide young people with skills needed to function in a world dependent on computers."

Herb Sang, Superintendent. "The use of computers will be just as important to a student's education as reading, writing and math."

Wendell Holmes, School Board Chairman. "I believe that preparing students for the information age should be a top priority in education."

Radio Shack
COLOR COMPUTER

A Model Computer for a Model School District

Through an arrangement between Tandy Corporation/Radio Shack and the Duval County Public Schools, educators nationwide will be able to view one of the most effective uses of computer technology for instructional purposes to be found anywhere. Duval County has been established as a national model urban school district, and the addition of the microcomputer centers at the elementary level will only serve to maintain this district's leadership role in education. Duval County officials look forward to long-term educational benefits as a result of their commitment to computer learning environments; benefits which include implementation of the Color LOGO language for elementary grade levels, instructional software to supplement existing subject study and creative approaches to learning and study skills.

RadioShack's TRS-80® Color Computer Ideal for Any Classroom!

Configurable to Your Budget and Needs. Our affordable Color Computers offer both price and feature flexibility for your particular budget and instructional needs. Choose the Standard BASIC Color Computer or the Extended BASIC Color Computer. Use either computer with our wide variety of Program Pak™ and cassette tape courseware. And you can expand with one or more external disk drives to use our powerful disk courseware. With a Network 2 or Network 3 Controller, you can share the learning experience by connecting up to 16 non-disk student stations to a "host" disk computer.

Building Skills Needed for a New World. The Color Computer is an ideal system for introducing students to computer terminology, interaction and programming. The BASIC programming language is built into the Color Computer, and Color LOGO—a language designed to help students grasp fundamental concepts by programming a "turtle" on the screen to do graphics—is available on Program Pak or disk. Our Computer Assisted Instruction courseware provides information, exercises and feedback to supplement the teacher's lessons. For example, one of our CAI courseware packages includes high-resolution graphics and recorded speech to provide facts about our solar system. Another presents six laboratory experiment simulations where students control variables and view the changing results. We also offer courseware packages to supplement instruction in math, science, history, reading and language arts and computer literacy. In addition, our authoring systems make it easy for teachers to develop their own courseware.

For the name of your Regional Educational Coordinator, call 800-433-5682, toll free. In Texas, call 800-772-8538.

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Apple Writer II

Stephen Arrants

Word processing is intensely personal. Loyalty to a package sometimes exceeds loyalty to one's political party. *Screenwriters* don't talk to *Wordstars,* an *Executive Secretary* is never seen out with a *Bank Street Writer.*

And those *Apple Writers*... a real breed apart. Imagine using a word processor from the manufacturer of your computer! Aren't hardware manufacturers the worst software publishers? They spend so much time and money to develop the hardware that software is often an afterthought. The "special" software is often thrown in to "sweeten" the deal. After all—you need something to run on your new computer, don't you? By the time you find out that the "free" software is about the worst imaginable, you have probably moved on to games and adventures.

Happily, *Apple Writer II,* redesigned for the new Apple IIe, is one of the best word processing packages around. *Apple Writer* is one of the original word processors. It has been improved and updated a few times, but in its latest incarnation, it takes full advantage of the redesign of the Apple, both inside and out.

creative computing
SOFTWARE PROFILE
Name: Apple Writer II
Type: Word-Processor
System: 64K Apple IIe,
80-column card optional
Format: Disk
Language: Machine language
Summary: One of the best word processor packages available for the Apple.
Price: $195
Manufacturer:
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014

Enhancements

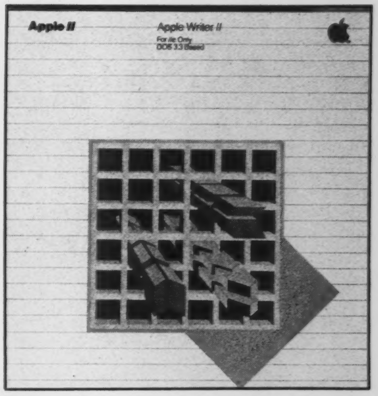
Cursor movement is much easier. Instead of a complicated ESC sequence, the four arrow keys move the cursor up or down one line or left and right one character. An arrow key used with the Solid-Apple key moves the cursor by word or 12 lines up or down. Using the Open-Apple key with the left or right arrow will copy text into a buffer for later insertion.

A DELETE key, now present on the keyboard, functions as a destructive backspace—anything deleted is gone forever. CTRL-W can still be used to delete text and store it in a buffer.

If at any time during use you need help, just type Open-Apple-? As long as the *Apple Writer* master or backup is in drive one, help screens on all aspects of *Apple Writer* use will be displayed.

Apple Writer II detects the presence of an 80-column card and sets the display for this mode. If you have a color monitor, the 80-column display looks shabby. This is because of the way a color monitor translates the display signal to the screen. Use the 40-column display when using a color monitor. If you still use a TV set as a monitor, the 80-column display can't be used. The card is not an absolute necessity, however. *Applewriter II* works fine with a 40-column display.

The display is a bit different. The data line may be toggled to a display of tab stops or no display at all, save text. The data line shows you in which direction *Apple Writer II* will seek in find and replace modes, available memory, document length, cursor position, tab position, and file name. Press ESC once and a tab stop display replaces the data line. Press ESC once more and all data lines are suppressed. Another ESC brings you back to the data line.



Retrieving repetitive terms from a glossary used to be an involved operation. You pressed CTRL-G and then the character designating the word or phrase. With *Apple Writer II,* you just press Open-Apple and the letter designator.

Commands are for the most part mnemonic, such as CTRL-S for save, CTRL-L for load, CTRL-F for find/replace, and CTRL-C for case change. A few are not—CTRL-O for DOS commands, for example. All are CTRL plus one key commands. A prompt then appears at the bottom of the screen asking for a file name, material to search for, etc. If you wish to load a file, but you don't remember its name, enter ? at the prompt. A disk catalog is displayed followed by the load prompt. Find the file, enter its name, and it is loaded into memory.

Do you wish to examine a file without loading it into main memory? Just enter the file name followed by a \ and the file is displayed. Pressing RETURN brings you back to the original file. This is useful when you want to examine earlier versions of a file without erasing the file on which you are working.

Underlining is much easier with *Apple Writer II*. In previous versions, you enclosed the text to be underlined with the \ character which was available only via a special key sequence. To underline between words, another key sequence was required. *Apple Writer II* does away with those complications, since the \ key is now on the Apple IIe keyboard. For example, to underline the words Apple Writer, you enter \Apple Writer\. Everything between the two backslashes is underlined, including spaces. To underline words only, enter a \ at the space: \Apple\Writer\ would underline only the two words, not the space between them. One other underlining improvement is that of a variable underline token. You may switch the specific token to whatever you wish. It can be a \, *, <, or almost any other character that makes sense to you.

As usual the documentation is about the best around.

Setting other printing commands is just as easy. CTRL-P brings you the Print prompt. Enter a ? and the values are displayed on screen. Enter the command and the value you wish to change. Press RETURN and you are back in the text mode. Print values may also be changed in text.

Suppose you wish to indent a block of text and have it single-spaced, for a long quote. Just enter a period followed by the command and its new value on a separate line. When you are done, just enter new values.

Word Processing Language

Included with *Apple Writer II* are special programs written in WPL, Word Processing Language. This language allows the creation of special programs which let you create form letters and mailing lists to do away with repetitive tasks. Some of the programs included on disk are a word counter, which counts the number of words in a specific document; a print value program, which aids in the setting of values for your display or printer; a spooling program, which lets you print several texts together; a form letter creator; and a program to convert *Apple Writer 1.1* programs to an *Apple Writer II* format.

Learning WPL isn't easy, but it can be done. A complaint about earlier versions of *Apple Writer* was that WPL was never fully explained. For the most part, this has been cleared up. The people at Apple have done an excellent job explaining this sometimes frustrating aspect of *Apple Writer*.

Documentation

As usual, the documentation is about the best around. Apple has listened to users' complaints and suggestions, and the result is clear, readable, and anything but boring.

First, Apple split the documentation into two parts: a manual on *Apple Writer II* and a separate manual on WPL. Each feature of *Apple Writer II* is explained carefully with plenty of examples. Each chapter is designed as a tutorial, and everything discussed in a particular chapter is reviewed at chapter's end. If something didn't sink in the first time, going over the material at the end should help.

The manual on WPL is excellent. WPL is not only explained in clear and simple language, but instructions on writing your own WPL programs are given. Naturally, not every user will take advantage of this. Not every user needs to write individual programs. Then again, it is nice to have this information handy when you want to try to write your own WPL program.

What's Missing

There are still a few features missing. Microjustification of spaces isn't available, but to me that is a small point. After all, microjustification may make text look good, but it won't improve your writing! A spelling checker along the lines of *SpellStar* or *The Sensible Speller* would be another useful addition. But these are minor complaints.

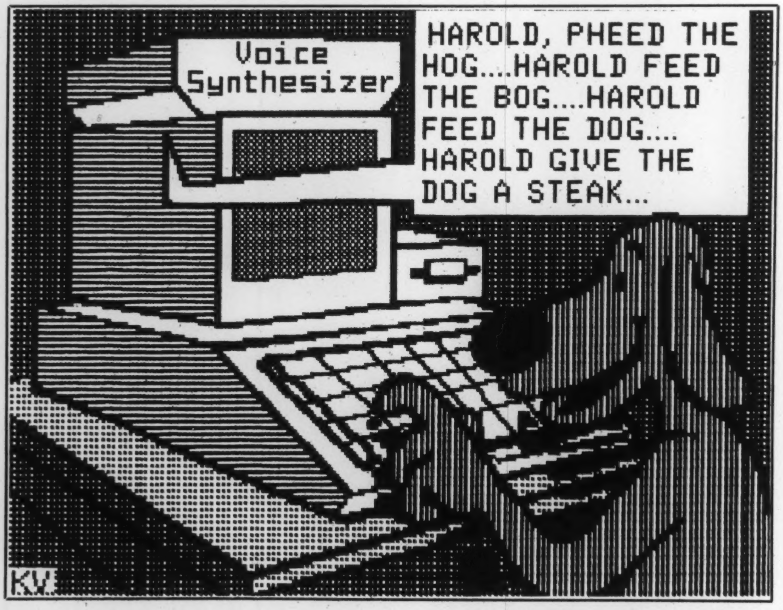
I have used many different word processors, and *Apple Writer II* is my favorite by a wide margin. I still don't like Apple's policy of copy-protecting the disks. For $195, they should allow the creation of one or two extra backups. (Apple provides one back-up.)

You only license the software; you don't purchase it outright. If both disks become unusable within 90 days of purchase, Apple will provide a new copy. After that, you are on your own. I wouldn't be too worried though. I have gone through three copies of the older version. Each time, Apple sent a replacement for a small charge. I hope they continue this service.

Summary

In its latest incarnation, *Apple Writer II* is perhaps the best word processor for the Apple. It uses fully the design changes in the Apple IIe, making it one of the easiest systems to use. Although learning all its tricks may take a little time and effort, I think you will be amply rewarded.

Apple Writer II is currently available as part of the Apple IIe introductory package. If you bought your IIe without *Apple Writer II*, seriously consider adding this excellent package to your library. ☐



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(ej' o͞o wâr) *n.*
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Elementary Mathematics

Introduction to Counting presents young children with the concepts of numbers, addition, subtraction, shape discrimination, weight, height, and measurement. *Apple, Atari disk $39.95. Atari tape $29.95.*

Arithmetic Skills teaches basic number skills. High resolution graphics, animation, and sound effects make counting, addition, subtraction, multiplication, and division interesting. *Apple $49.95.*

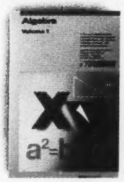
Fractions builds and reinforces skills in working with fractions. Definitions, numerators, denominators, addition, subtraction, multiplication, and division are explained in small increments and a learning manager makes the program flexible to meet the needs of individual learners. *Apple $49.00.*

Compu-Math™ Fractions, a comparable *Atari* program is also available. *Atari disk $39.95. Atari tape $29.95.*

Decimals presents addition, subtraction, multiplication, division, rounding off, percentage and conversion as they apply to decimals. *Apple $49.00.*

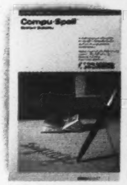
Compu-Math™ Decimals, a comparable *Atari* program is also available. *Atari disk $39.95. Atari tape $29.95.*

Advanced Mathematics



Algebra, volumes 1 through 6 is a series of independent programs comprising a first-year course in algebra. Concepts are presented in four distinct learning styles so that self-managed learning is encouraged. Volumes 1 through 4: *Apple, IBM PC $39.95 each.* Volumes 5 and 6 (sold as a set): *Apple, IBM PC $49.95.*

Language Skills



Spelling and Reading Primer™ uses simple words and pictures to introduce basic reading and spelling skills. Word groups cover simple two- and three-letter words through difficult multi-syllable words, double vowels and consonants, and directions and numbers. *Apple $39.95.*

Compu-Spell™ builds spelling skills in a tutorial format. A system diskette can be used with six different data diskettes geared to vocabulary for grades 4, 5, 6, 7, 8, and an adult level containing words commonly misspelled in business. System Diskette: *Apple $29.95.* Data Diskettes: *Apple $19.95 each.*

Compu-Read™ improves reading speed, recall, and test-taking skills. The system adjusts itself to your learning requirements and provides detailed information on progress and reading rates. *Apple, Atari disk $29.95. Atari tape $24.95.*

PSAT Word Attack Skills and **SAT Word Attack Skills** develop specific vocabulary skills in definition, connotation, roots and prefixes, and application. Test-taking skills required for the Scholastic Aptitude Tests are sharpened. *Apple $49.00 each.*

PSAT/SAT Analogies develops skills tested in the analogies portion of college entrance examinations. Word relationships, meanings, and achieving under test-taking conditions are stressed. *Apple $49.00.*

Introduction to Poetry presents rhyme and meter in a clear and simple tutorial format. Definitions are given on the screen and are sounded out by your computer. The program is highly interactive and easy to operate. *Apple $39.95.*

Computer Skills

Hands On BASIC™ Programming combines hand-holding software with a 200-page tutorial that steps the novice through beginning BASIC programming. This complete learning system won't leave you hanging with an error message. Special features allow you to diagnose the problem and correct your mistake. *Apple $79.00.*

DRAGONWARE™
Entertaining, colorful, animated games with lasting educational value, for ages 4 through 10. Webster, our wise and wonderful dragon, is your child's companion in the adventure of computer-based learning.

Spelling Bee Games™ contains four fun activities in which hand/eye coordination, memory skills, and motor skills are exercised. Twenty-two word lists covering simple two- and three-letter words through multi-syllable words provide variety and scope. *Apple, Atari disk $39.95.*

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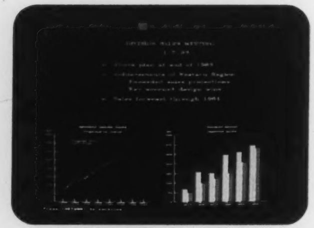
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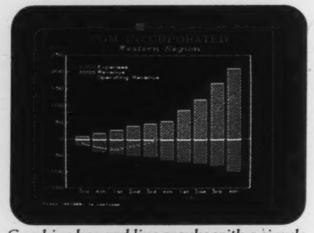
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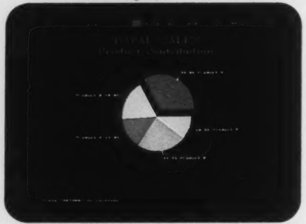
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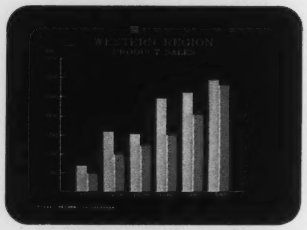
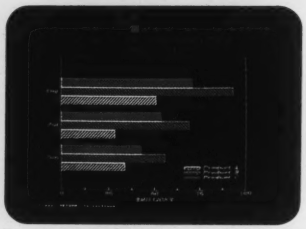

Create clustered bar graphs.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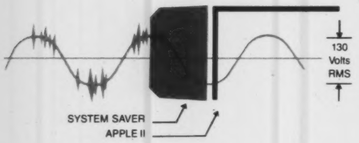

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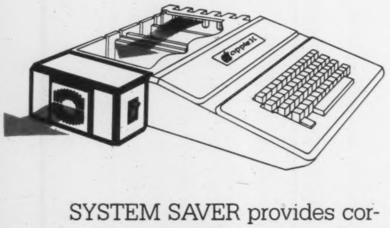

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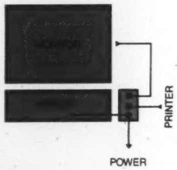

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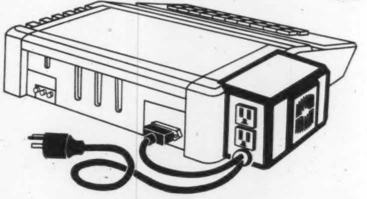

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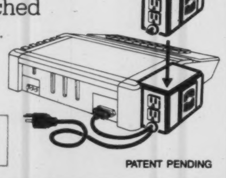

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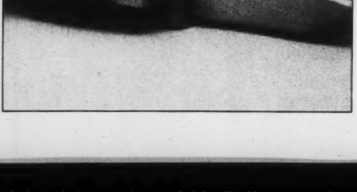

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Educational Programs For The Very Young

Brian J. Murphy

If you are the parent of a young child and also the owner of a personal computer, you are in an excellent position to give your child a painless and entertaining introduction to reading, writing, and numbers—and to using a computer.

The trick is to find software that is easy for a child to use successfully, that will not put so much pressure on your little one that he becomes discouraged.

Perhaps even more difficult is finding software that teaches skills that are worth having and that do it in a consistent, entertaining manner.

The packages reviewed here are, in my opinion, worthwhile on all counts. Let's start with programs suitable for the very young.

Early Games For Young Children

The first is John Paulson's *Early Games for Young Children* released by Counterpoint Software. This set of games allows very young children to approach the computer in a relaxed, low pressure atmosphere. The emphasis is on enjoyment.

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SOFTWARE PROFILE

Name: Early Games for Young Children

Type: Math and Language learning games

System: 48K Apple II, II Plus; disk drive

Format: Disk

Language: Applesoft

Summary: Good games for the very young making their very first approach to a computer.

Price: $29.95

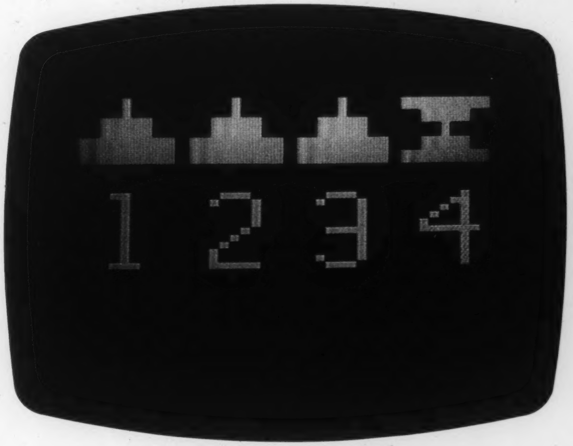
Manufacturer:
Counterpoint Software Inc.
Suite 140 Shelard Plaza North
Minneapolis, MN 55426

Nine games are available in the Apple II version we examined: Match Numbers, Match Letters, Count, Add, Subtract, Alphabet, Names, Draw, and Compare Shapes. The programs are selected from a low-res graphics "picture menu." All the child has to do is hit the spacebar when a picture of the game he wants to play comes on screen.

The game that a young child will probably find most entertaining is Draw. In this game the child can place low-resolution graphics shapes on the screen just by pressing single keys on the keyboard. Some keys draw horizontal lines, others vertical and diagonal. The colors are changed by strokes of the spacebar.

For the very young user, help and encouragement from Mom or Dad will make this game more rewarding. Hint: Don't expect your baby to draw neat little pictures of houses and trees the first time out—or ever, for that matter. Remember, this is supposed to be entertainment. Encourage your child to doodle, to enjoy the colors and shapes that appear on screen.

If your child is especially happy with his artwork, use the save feature to record



Early Games for Young Children

Early Games Music

Brian J. Murphy, 133 Post Rd., Fairfield, CT 06430.

the picture to the program disk. This will not only preserve your youngster's masterpiece but will also reinforce his positive feelings about himself—especially if it is you who suggests saving the picture.

Compare Shapes

In the Compare Shapes game, graphics are once again used to good advantage, this time to help the child to develop skills in evaluating visual information and drawing conclusions from it. The child is confronted with four shapes numbered 1 through 4. The idea of the game is to key in the number of the shape which differs from the other three. Again, parents will have to help very young children, but most should catch on quickly. Basic visual, problem solving, and analytic skills are emphasized here.

Match Numbers And Match Letters

Two more entertaining and useful games on this disk are Match Numbers and Match Letters. In these games the child is shown a large number or letter drawn on the low-res screen. To play, he simply keys in the character which matches the display on the screen. That is the whole game, and for the purposes of entertainment for a preschooler, it is fine.

For learning purposes, the child is given practice using the computer keyboard and a chance to become familiar with the symbols on it.

On the minus side, it must be observed that there is no counting involved with the numbers and no phonetics included with the letters. Mom and Dad must supply this supplementary material, but it is well worth the effort, of course, since the child will probably show an early eagerness to know what these symbols are all about. Take advantage of that opportunity.

Add and Subtract

Add and Subtract, the arithmetic games, are not as well thought out as the other games on this disk and may be a little frustrating for a preschooler. Add and Subtract presuppose skills in understanding numbers that are more typical of Kindergarten and Grade 1 students than preschoolers. To succeed with these games requires that your preschooler have some arithmetic tutoring at home.

On the low-res screen, the child sees several blocks and an add or subtract function symbol followed by more blocks representing the number to be added or subtracted. This is what teachers call a problem in whole numbers—the level on which a child first understands the concept of quantities. If the problem were to be kept on a whole number basis, the child would solve the problem in terms of graphics—by drawing or erasing blocks.

That is not the case in these games. To solve the problem the child must follow several steps. First he must translate the purely graphic information he sees on screen into verbal form (three plus two), then make the leap from verbal language to symbolic language (3 + 2), perform the arithmetic, then select the correct numeric character on the computer keyboard to respond correctly.

As the child plays, the screen fills with lines, angles, and boxes.

Making these conversions is no challenge to a grownup; adults make the transitions from whole numbers to verbal expressions to symbols instantaneously and without conscious effort. But for a preschooler, with at best a shaky understanding of whole numbers, these games could prove frustrating without adequate preparation and adult involvement.

These are not good "first games" for a very young child. If the correct responses could have been made by adding or subtracting blocks on the graphics screen, thus keeping things on a whole number basis, the Add and Subtract games would have been much more appropriate—and valuable.

Counting

In Counting the child is shown a number of blocks and must choose the number symbol on the computer keyboard which correctly describes the quantity on screen. The arithmetic function of Add and Subtract is not included, making the game a little easier. What is required is counting out and, again, the transition from whole numbers to verbal expressions and then to symbols.

The support of an adult is again crucial for the games to be of real benefit. Otherwise the child will simply hunt and peck across the keyboard looking for the correct response until he stumbles across it. That is neither entertainment nor education.

Names

Names is an entertaining game which uses a child's inborn fascination with himself to provide the motivation. The child types in his name and is then asked to spell it, providing practice in typing. A correct response is rewarded with a jazzy low-res graphics recapitulation of the spelling. The routine ends with the child keying in his name again for the same reward. If a more intense learning experience is desired, parents can help children to sound out the names as they are keyed in and as the program spells them on screen.

Alphabet

Alphabet is a cute little routine which efficiently and painlessly performs the task of teaching the alphabet. The game starts with a big, low-res A and waits for the child to key in the next letter in the alphabet. As long as the child makes correct responses, the progression of graphics letters proceeds uninterrupted. If the child makes a mistake, the alphabet up to the point of the error is recapitulated in the text window at the bottom of the screen. This gives the child a chance to sing his ABC song and figure out what the next letter must be. This is a nicely thought out, entertaining and simple game that should easily hold the interest of a child.

Early Games Music

Early Games Music is a companion program package which is designed to give preschoolers their first introduction to music through the medium of enjoyable games. As with the learning games on the previous disk, the child can select the various programs in the package from a picture menu.

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SOFTWARE PROFILE

Name: Early Games Music

Type: Music learning games

System: 48K Apple II, II Plus; disk drive

Format: Disk

Language: Applesoft

Summary: Games for preschoolers well designed to foster an early interest in music.

Price: $29.95

Manufacturer:

Counterpoint Software Inc.
Suite 140 Shelard Plaza North
Minneapolis, MN 55426

One of the programs, Kaleidoscope, should prove popular with young users. For each stroke of a number key a musical note is played and a graphics shape appears on the low-res color screen. As the child plays, the screen fills with lines, angles, and boxes. This game provides a good "hook" for the more serious activities available on the disk.

In Guido's Quiz (named after the eleventh century monk who named the notes of the musical scale) the screen displays piano keyboard, a bass clef, or a

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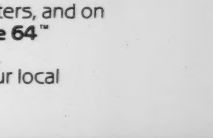

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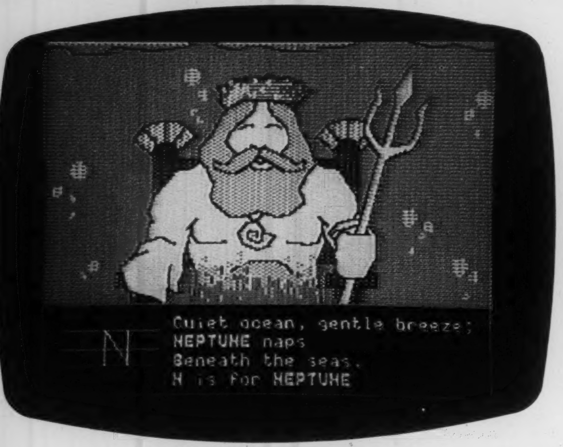
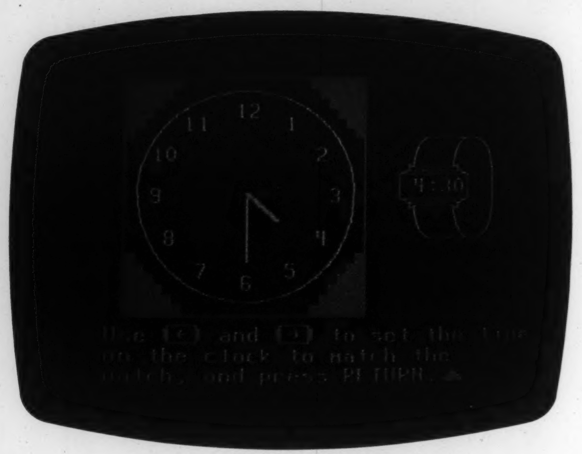

Quiet ocean, gentle breeze;
NEPTUNE naps
Beneath the seas.
N is for NEPTUNE

Alphabet Beasts and Co.


Use (←) and (→) to set the time
on the clock to match the
watch, and press RETURN.

Learning About Numbers

treble clef, as you prefer, with all the notes named (the scale of musical notes, by the way, is named by single letters from A to G). As the program runs, a note disappears and a matching tone is played on the speaker. The child must strike the appropriate letter key on the keyboard to respond correctly.

At first glance this does not seem like an especially challenging game. But consider the age of the children for whom it is designed and the likelihood that this is the first exposure they have had to keyboards and written music. It is then that the value of this gentle, no-pressure approach becomes easy to understand. This is a musical activity the child can succeed at and enjoy; it makes music fun and introduces concepts that will be valuable later on, especially if the child is to play an instrument.

The Perform/Record/Playback program allows the child to key in melodies at random. As the child keys in the music, the results are displayed on the video keyboard, treble clef, or bass clef, as the child wishes. This visual activity is eye-catching and helps to reinforce the concept that the tones the child is hearing have their counterparts on the keyboard and in written music.

If the child wishes, the music can be saved to the program disk and played back. As with the graphics save feature in the learning programs, your encouragement as a parent to the child to save his musical masterworks will help to enhance this positive learning experience.

Children are susceptible to the urge to make melodies, and the *Early Games Music* program offers a way for a beginner to try, with the Melody Tutor. This program plays like a Simon Says game. The notes played by the computer speaker are also displayed on the screen (in number form instead of letter form, unfortunately, but it is the only logical way to use the full range of notes provided in the program).

After the music plays and the notes are displayed, the program pauses to allow the child to imitate the sequence from the keyboard. If the child makes a mistake, the program replays the music and allows for a second try. This program really isn't a valid preparation for instrument playing; it simply gives the child an opportunity to play a recognizable tune, which of itself is a wonderful reinforcement of his interest in music.

The idea with the *Early Games* program packages is to provide very young children with first experiences at the computer keyboard that will entertain and teach. The packages succeed in that respect; they are a good introduction to the computer and to the subjects they teach for a preschooler.

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SOFTWARE PROFILE

Name: Alphabet Beasts & Co.

Type: Alphabet, numbers primer

System: 48K Apple II, II Plus, IIe; disk drive

Format: Disk

Language: Applesoft, Machine language

Summary: Superb graphics, inventive approach make this a great tool to teach letters and numbers.

Price: $29.95

Manufacturer:
Software Productions
2357 Southway Dr.
P.O. Box 21341
Columbus, OH 43221

Alphabet Beasts and Co.

When we all learned our alphabet, we learned it in pretty much the same way, by singing the alphabet song and having books read to us proclaiming, "A is for Apple, B is for Ball," and so forth. But did you ever imagine that B would stand for Baba Yaga the witch, I for Icarus, or D for Dragon?

Alphabet Beasts and Co. by Software Productions is not just an alphabet primer; it is an exotic collection of elves, mythical beasts, and characters from legend portrayed in some of the very finest hi-res color graphics ever concocted for an educational software package.

The disk is easy to use. After the initial boot, you simply select a letter, hoist your three-year-old onto your lap, and watch the colorful alphabet show unfold. Each time a letter is pressed, a little presentation appears on screen. First, there appears a hi-res illustration, then a little verse in which the subject letter appears. Here are two of the verses:

My new ROBOT, her name's Rose
I taught her all
The games she knows!
R is for ROBOT.

In a hut upon chicken feet
BABA YAGA the witch
Struts down the street.
B is for BABA YAGA.

These verses are, of course, meant to be read aloud to the child. For a beginning reader they are a good medium for practice in phonics—sounding out the words. Several of the verses repeat the sound of the letter over and over, giving you the

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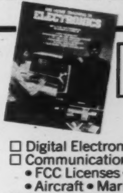

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Accredited by the Accrediting Commission of the National Home Study Council opportunity to emphasize the phonic value of the letter.

Here is an example for the letter M, a verse in which five of the words begin with that letter, giving you multiple opportunities to read and emphasize the M sound for your child.

At this very moment
Magic will be made
By Merlin the MAGICIAN.
M is for MAGICIAN

In connection with the opportunities for phonics practice, the program offers an ingenious animation of block printing for each letter in the text area under the individual illustrations. Three ruled lines are displayed to the bottom left of the screen, simulating ruled composition paper. Each letter chosen is drawn on that space, in just the manner a child would be taught in school. The child, having seen the picture and heard the verse read aloud, enters the appropriate letter from the keyboard, which begins the letter drawing process, complete with entertaining sound effects.

Watching this animation, a child might be easily motivated to take up the challenge and attempt to draw the letter himself. At that point you *run* to wherever you keep your papers and pencils and let your child have a go at it. Be patient and helpful as the child makes his first efforts; after all, what we are talking about is a head start in reading and writing.

One of the most delightful aspects of the program is the subject matter for the alphabet primer. A clever parent can use the subject matter of mythical monsters, elves, characters from Greek mythology, and all the other myriad magical manifestations as a departure point for many a fine session of storytelling and read-aloud.

Used with imagination, this program can be not just an introduction to the alphabet, but to the entire world of reading. The pictures are so beautifully executed and the subject matter so imaginative, that a child almost has to want to know more about them. That is your cue to bring out the appropriate storybook for a read aloud, read along session.

Number Tutor

Alphabet Beasts and Co. also includes a number tutor. All you have to do to access the numbers at any time in the program is to press one of the number keys. A fascinating little sequence which depicts the number in counting, verbal form, and numeric symbol will ensue.

First, the name of the number is written in block letters in an animation at the bottom of the screen. The Arabic number symbol is then written alongside the verbal expression. Then, in the graphics screen above, an animated fire-breathing dragon appears to create a picture of a dragon (or dragons) bent into the shape of the number symbol. Finally, one at a time, little dragons appear to the right of the graphics screen until the appropriate number is reached.

This number sequence not only introduces the three major ways of expressing a numeric value (whole number, verbal expression, numeric symbol), it also provides counting practice and, most importantly, the entertainment to sustain the interest of the child.

Rounding out this package is a cute game called Creature Features in which the child can create, on the hi-res graphics screen, creatures combining the various parts of a dragon, an alien, a genie, and a little boy. Once the creature is created, the program projects the figure into one of a number of settings, including a city landscape, the moon, a sidewalk by a schoolbus and—my favorite—at the dinner table to the astonishment of a typical mom and dad. There are 256 different combinations of monsters the child can make, which promises that the program will have the power to entertain and stimulate your youngster's imagination for extended periods.

Alphabet Beasts and Co. embodies all of the most important virtues one expects in educational software for the home. It has great graphics, it is well thought out, it is entertaining for children and for their parents, it stimulates the imagination, it is rich in subject matter; and it is easy to use. It also costs much less ($29.95) than many educational programs we have seen which attempt to teach the same material but which do not offer the same high level of beauty in graphics or imagination in overall design. *Alphabet Beasts* should find an honored place in the software libraries of many a home and school.

Learning About Numbers

Too many of the programs designed to assist in teaching elementary arithmetic are very well-intentioned and very clever without being well thought out or comprehensive. *Learning About Numbers* is an important exception to this trend.

Learning About Numbers is a math education program suitable for grades K through 3 from C & C Software. It is well designed as a game for very young children and as a tool for teaching the most basic concepts about numbers.

Let's Count

The simplest program in this package is Let's Count, a wonderful first introduction to numbers. In this game the child learns to count recognizable objects such as flowers, houses, and cars. At the simplest levels of the game, the activity is restricted to counting the objects on the screen. With each right answer the student gets, a happy face appears on the screen to reinforce the feeling of success and to inspire continued play.

As the student demonstrates proficiency in answering the problems (90% correct answers) the difficulty level increases. At this point the items to be counted are grouped in sets, with boxes drawn around each set to emphasize the groupings. This instruction in sets is an important preparation for the development of skills in addition and subtraction, and is an indication of the planning evident in this package.

Addition is phased into the game, using the sets. A typical addition problem in this set format works like this: First, a box with three flowers is displayed on the screen. The child counts the flowers and types a 3. A second box appears on the screen, this time with two flowers. The child counts, then types a 2. A box with five flowers is then shown, and the student counts the result and enters the correct number, 5, from the keyboard.

creative computing

SOFTWARE PROFILE

Name: Learning About Numbers Vol. 1

Type: Counting, arithmetic tutor

System: 48K Apple II, II Plus, IIe; disk drive

Format: Disk

Language: Applesoft, machine language

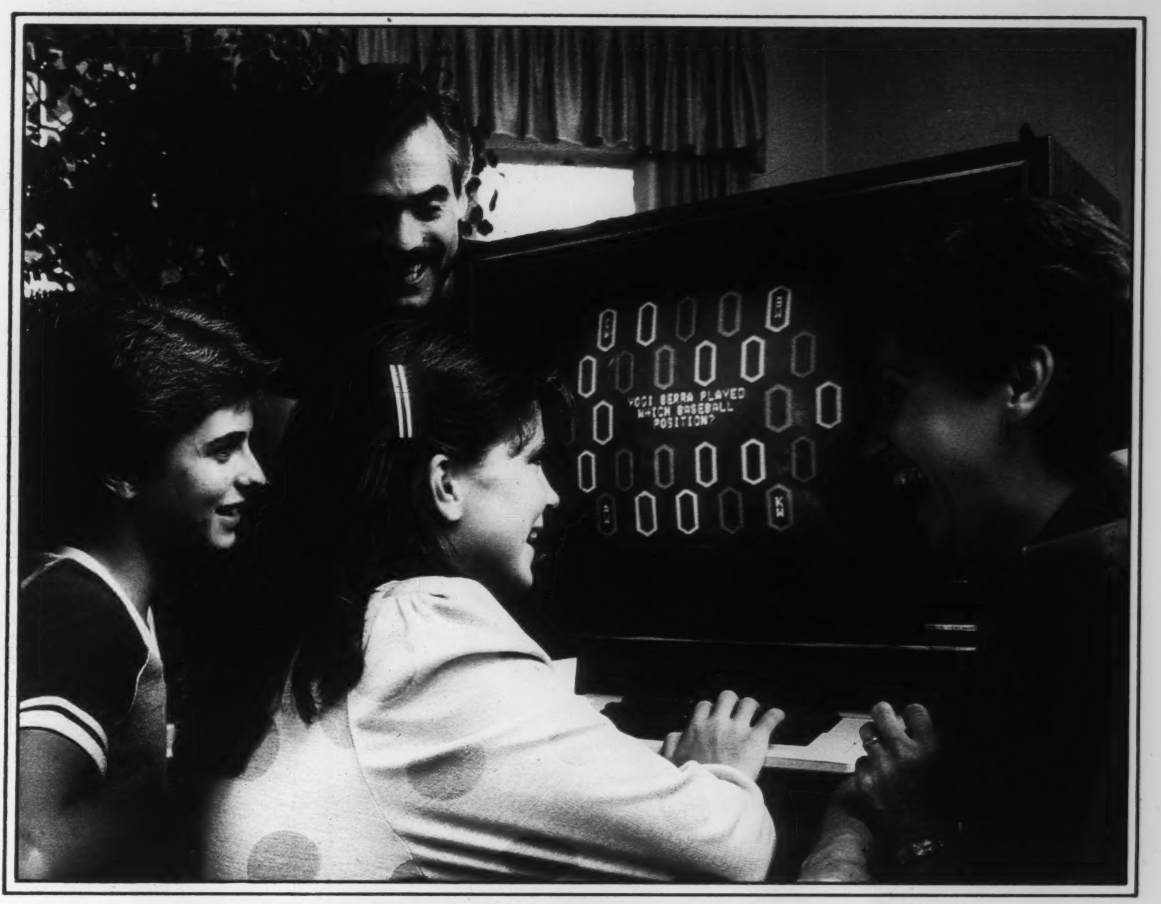
Summary: An intelligent methodical language approach to teaching counting that will engage and keep the interest of children.

Price: $40

Manufacturer:
C & C Software
5713 Kentford Circle
Withita, KS 67220

In this exercise the child has had practice in counting and exposure to the whole number approach to addition. He also benefits from the graphics which illustrate the processes of counting and addition for better understanding.

To make this exercise work, teacher supervision is crucial, especially for children using the program for the first time. The child will need guidance to understand that the number of objects on the screen, the verbal counting he must do to tally them, and the number symbol he must key in are related. Once that level of comprehension is reached, the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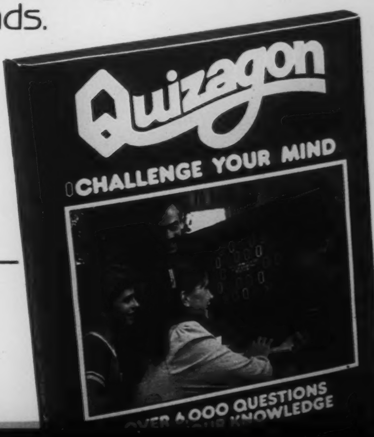
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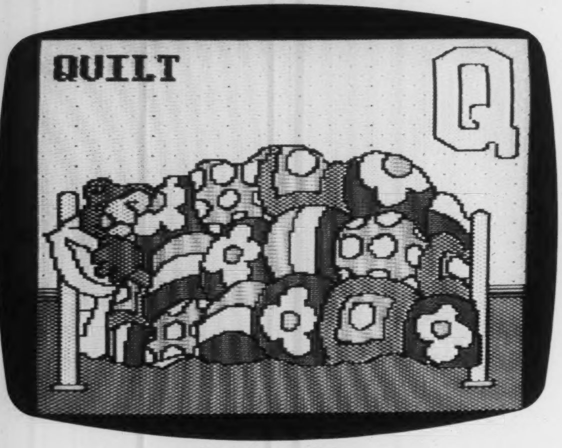
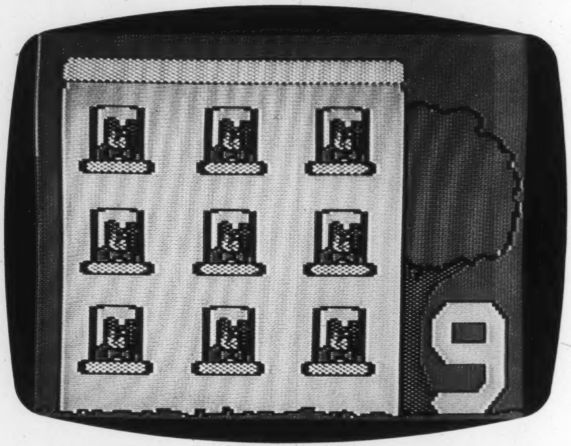


Stickybear ABC



Stickybear Numbers

child will find it easy to select the program from the picture menu and practice with it on his own.

Arithmetic Fun

The next level of math skills is represented in the Arithmetic Fun program for addition and subtraction. In this game, the child deals strictly with numeric characters. Reinforcement is provided by a rather interesting collection of hi-res graphics characters: a little prince locked in a dungeon, the troll digging his way to the dungeon to carry him off, and the little heroine trying to get to the dungeon to rescue the prince.

The child can choose to help either the troll or the heroine; each correct response brings his chosen character closer to the goal. This is a game that should easily hold the attention of children from grades K through 2.

As the child practices with this game, and as the number of correct responses increases, the skill level increases. There are nine levels of difficulty in all. At the first level, the first number added is from 1 to 3, the second from 1 to 2. If the child progresses to level 9, numbers 0 to 9 are used, as are multiples of 10. (In fact, multiples of ten begin to appear at skill level 4.)

The same prince-troll-heroine game format is used for the Arithmetic Fun multiplication game. In this game the skill levels begin with the multiplication or division of numbers from 1 to 3 by numbers ranging from 1 to 2. At the highest skill level, the numbers are from 0 to 9. Multiples of 10 appear in Level 3. Using the Educational Management routines provided in the package, the teacher can set time limits, ranging from 1 to 15 seconds, for the responses in these games. The teacher can also opt for no time restrictions at all.

Let's Tell Time

The final program on the disk is Let's Tell Time. On the graphics screen appear a clock face and a digital watch. Using the arrow keys, the child must move the hands on the clock face until they match the time displayed on the digital watch. Again, the difficulty of the problems posed is graded by skill level.

Each correct response brings his chosen character closer to the goal.

At the lowest skill level, the child must move the minute hand only five or ten minutes and the time shown is always on the hour. As the difficulty level increases, he must move the minute hand farther to half and quarter hour settings. At the fifth of the nine levels, some of the numbers on the clock face disappear, leaving 12, 3, 6, and 9 only. At the highest level of difficulty the times can be at any of the 12 five-minute intervals on the clock face.

In the Management program, there are several routines which assist the teacher in monitoring the progress of the student and in customizing the games to meet the needs of individual students or the class as a whole.

One of the options available includes keeping a roster of the students using the program. The roster tallies the number of program runs made by the student, the number of right answers, and the number of answers right on the first try. The teacher can erase the scores or change names on the roster as desired.

The Management program also allows the teacher to create a list of exclusive users, to turn graphics reinforcements and sound effects on or off, and to establish the requirements for advancement to higher skill levels within the arithmetic and counting games.

This program is extremely well thought out, both as entertainment to maintain the interest of children in learning and as a methodical and effective classroom aid.

Stickybear

Smokey the Bear, Yogi Bear, Paddington Bear, and Winnie the Pooh had better watch out. The computer era has given birth to the bear of the future, Xerox/Weekly Reader's Stickybear. He is the hero of some of the most polished educational software ever created for the Apple II.

More precisely, Stickybear is the central character of *Stickybear Numbers, Stickybear ABC*, and *Stickybear Bop*, software packages that not only educate as they entertain but do both exceptionally well. Stickybear and his family are the creations of children's illustrator Richard Hefter, realized in high-resolution color graphics. In *Stickybear ABC* Hefter's cast of characters helps to illustrate the alphabet using animation and sound effects creatively.

For once, the old cliche is valid: This program is so simple a child can figure it out. All you have to do is slip the disk into your drive, boot it up, and turn the keyboard over to your preschooler. Any letter he hits on the board will result in an animated graphic of an object that begins with that letter. If he keys W, he may see a windmill, or watch and listen as Stickybear blows a whistle. Hitting Q may result in a picture of a stately queen marching by, or a view of Stickybear sleeping snugly under a quilt.

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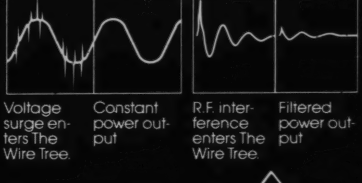

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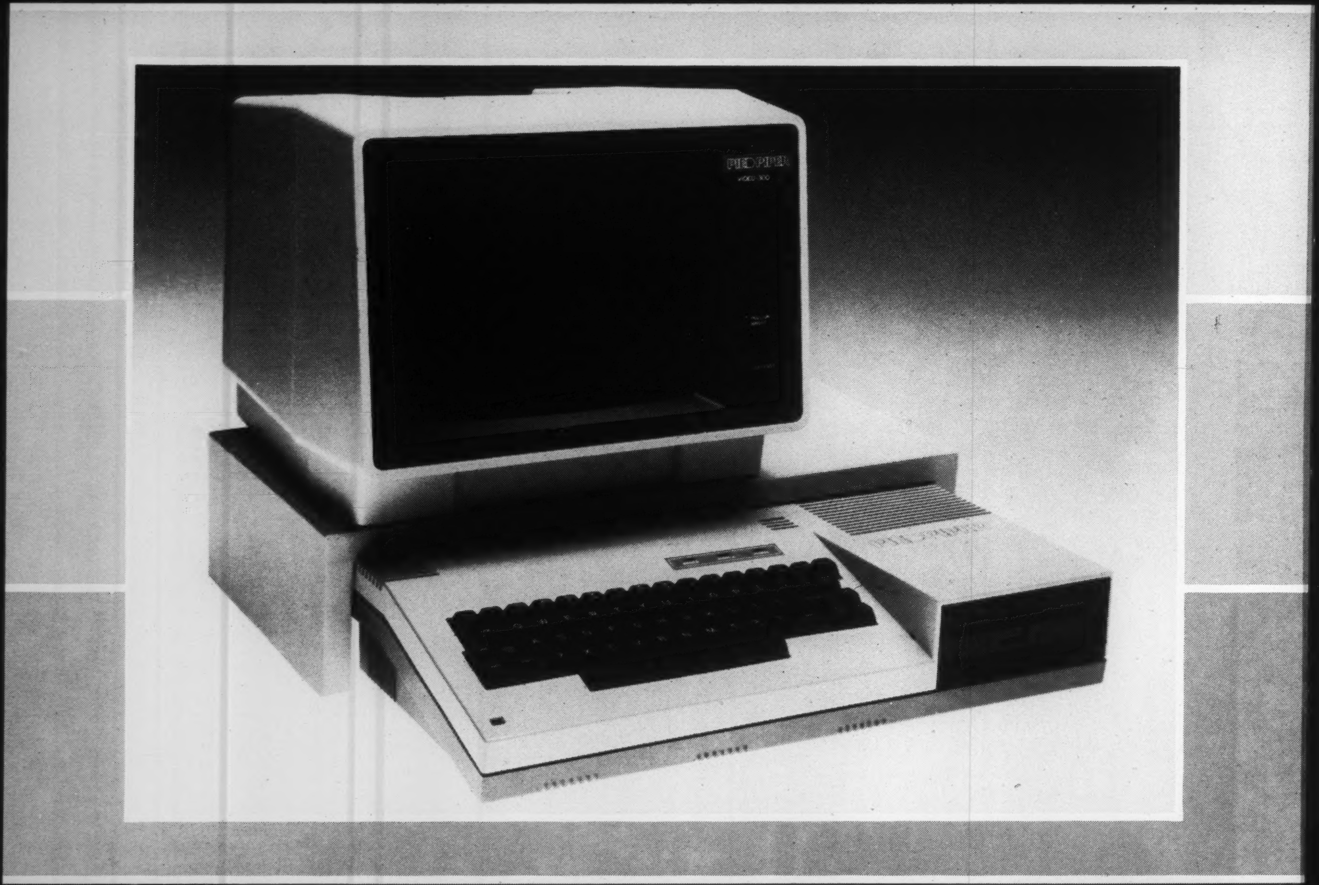

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CIRCLE 254 ON READER SERVICE CARD

Educational Games, continued...

Even for an adult, the temptation to go through the entire selection of 52 graphics is virtually irresistible. Any parent testing this package in a computer store will hardly be able to wait to bring it home to try it out on Junior. They never made ABC books like this when *we* were little.

creative computing
SOFTWARE PROFILE
Name: Stickybear ABC
Type: Educational
Systems: 48K Apple II or Apple III in emulation mode.
Format: Disk
Language: Assembly
Summary: Outstanding ABC primer with great graphics.
Price: $39.95
Manufacturer:
Xerox Education Publications
/Weekly Reader
245 Long Hill Rd.
Middletown, CT 06457

In addition to the disk, the package comes with an entertaining hardcover children's book by Hefter, "The Strawberry Look Book." This is not an ABC primer but a little vocabulary builder. The Stickybear family goes shopping in town, and the book illustrates and names all the things they see. Having been made receptive to the Stickybears by the program, a primary grade youngster should be ready for more of their adventures, and quite receptive to Mom or Dad reading the Look Book aloud or reading it on his own.

Further support and reinforcement comes in the package in the form of colorful Stickybear stickers which can decorate lunchboxes, toychests, etc. and a Stickybear ABC poster, suitable for display at home or in the classroom.

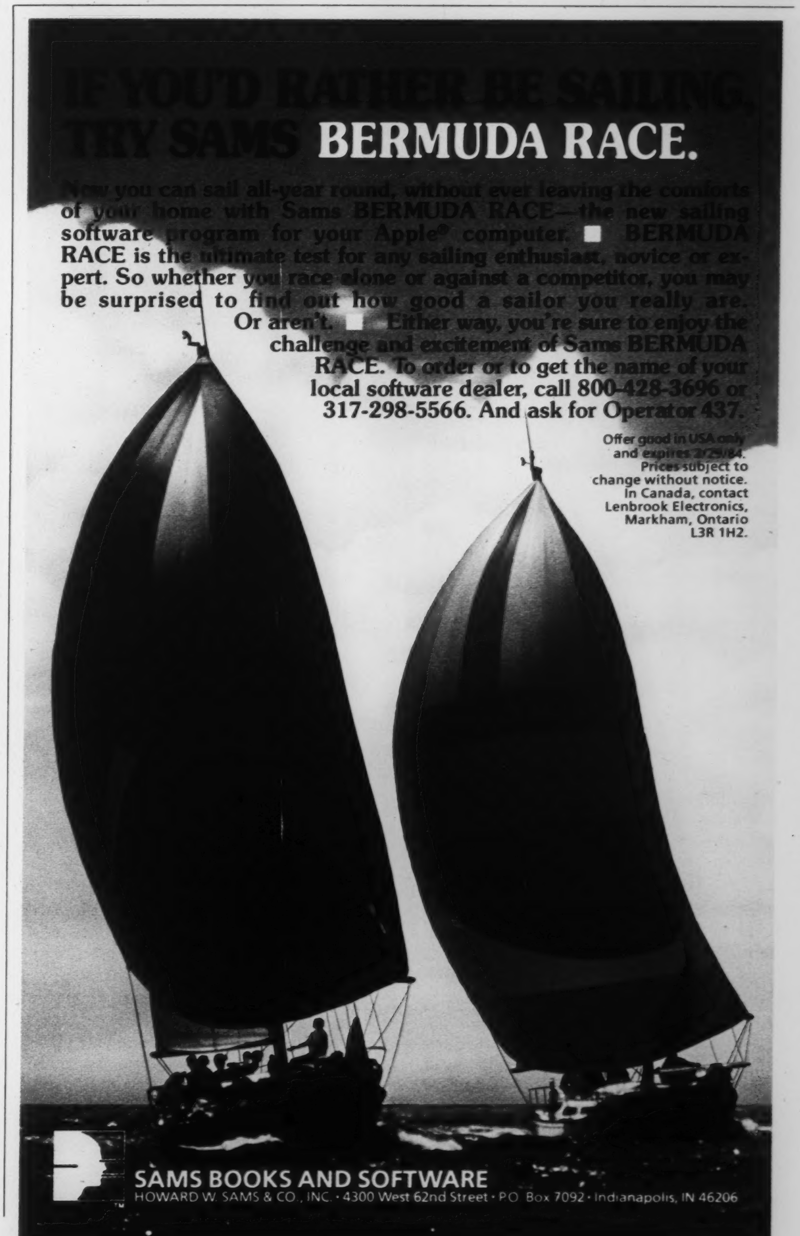
creative computing
SOFTWARE PROFILE
Name: Stickybear Numbers
Type: Educational
Systems: 48K Apple II or Apple III in emulation mode
Format: Disk
Language: Assembly
Summary: Super program for learning counting and numbers with wonderful graphics.
Price: $39.95
Manufacturer:
Xerox Education Publications
/Weekly Reader
245 Long Hill Rd.
Middletown, CT 06457

Stickybear Numbers

Equally handsome is the *Stickybear Numbers* package. It boots as easily as the alphabet program and operates similarly. The youngster simply selects a number and sees it illustrated in color graphics and sound. The major difference is that there are more shapes and picture formats to illustrate the numbers than in the ABC program offers for letters.

You see spinning hats, ice cream sundaes, Stickybears emerging from windows, airplanes, spaceships, furiously revolving planets, flying birds, stars, fish, boats, and so on. This apparently random use of shapes and picture formats makes *Numbers* even more exciting for a youngster than the ABC program. Of more value is the way that these shapes are animated. They are placed on the screen one by one to introduce and reinforce the concepts of counting.

As with the ABC program, there are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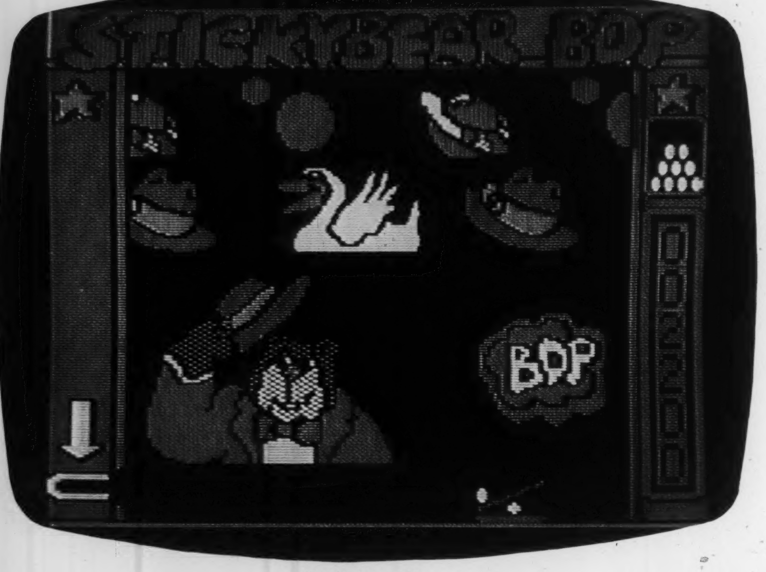


Stickybear Bop

supporting materials, including a color poster, stickers, and a hardcover book, "One Bear, Two Bears" in the package. The book serves the same purpose as the program; it introduces counting and addition and subtraction concepts at the most basic level. Again, this is a book that can be read aloud or read alone by the child. Interest is almost assured if the child is primed by a session on the computer.

Stickybear Bop

After a busy session with *ABC* and *Numbers*, parent and child deserve some recreation, and what better way to get it than by enjoying a session of *Stickybear Bop*, a pleasingly non-violent arcade game which Mom and Dad are as likely as their very small children to enjoy.

There are six rounds in the game, each with its own set of rules and requirements. You control a teetertotter board using single key commands or a paddle or joystick. When you key 1 or press the paddle 0 button, the board tosses a ball at one of the moving targets. In the various rounds you shoot at planets, stars, ducks, members of the Stickybear family, and so forth. Ten misses and you are out of the game.

In round one you aim at a shooting gallery full of targets; hit one with your ball and the target disappears in a puff of smoke superimposed by the legend BOP! It is comic and cute.

In later rounds you aim at objects juggled by Mr. and Mrs. Stickybear and at a pair of little birds which try to steal the little white balls you need to play with. In another round you try to hit sandbags dropped by Stickybear from his hot air balloon. Hit three and you increase your stock of ammunition by one. If you are hit by a sandbag, your teetertotter board goes SPLAT! and the game is over. The games are all fun and not at all violent.

creative computing
SOFTWARE PROFILE

Name: Stickybear Bop
Type: Arcade game
Systems: 48K Apple or Apple III in emulation mode
Format: Disk
Language: Assembly
Summary: Very entertaining multi-level arcade game for all ages.
Price: $39.95
Manufacturer:
Xerox Education Publications /Weekly Reader
245 Long Hill Rd.
Middletown, CT 06457

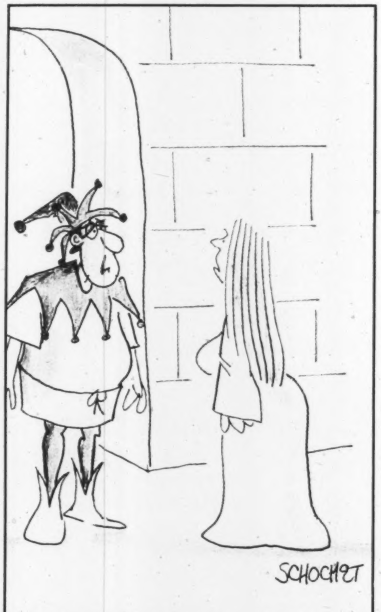
More than just a word is in order in discussing the artistic qualities of this software and supporting materials. It is an axiom of the entertainment software business that the cover art on a game package far exceeds the realism and artistic quality of the actual game graphics. This is not the case with the Stickybear series.

What you see on the cover is exactly what you get on the inside. The illustrations created by Richard Hefter for his series would look great in a book; they look just as good on the hi-res screen. Hefter obviously understood the limitations and the potential of Apple graphics. The finished product does not make you continually aware that you are watching computer graphics. It is more like watching a children's book come to life.

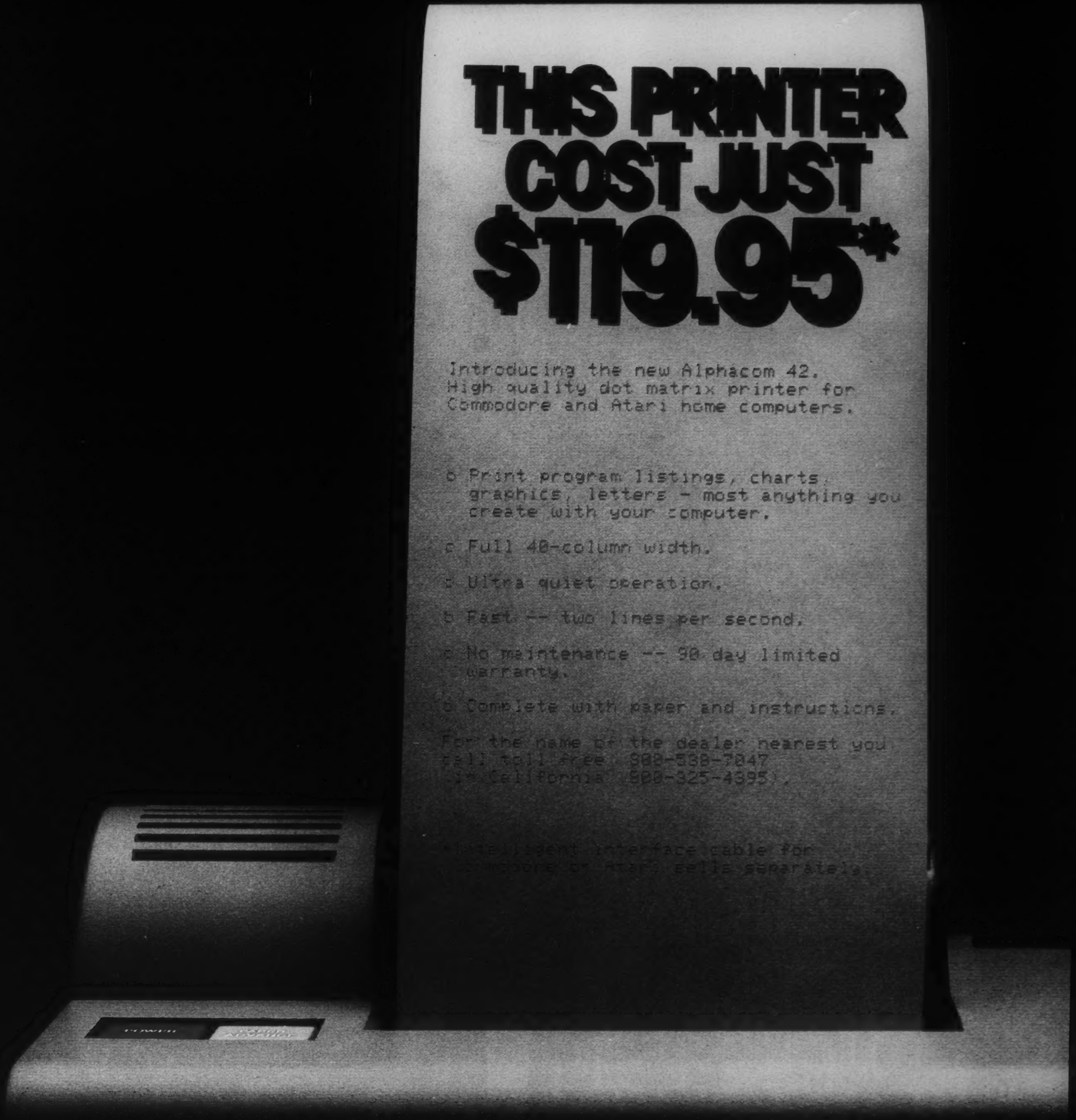
In a classroom setting, the Stickybear series would be a valuable resource for instruction on the kindergarten and first grade levels. The bright colors, animation, and sound effects are well-suited to attract and hold a child's attention. Youngsters won't have to be chained to the computer to run the Stickybear programs. Once you have grabbed them with the flashy colors and sound, the actual learning will come easily.

Teachers and parents can participate in the action, helping the child to sound out the letters and the words and by counting along with the program.

Xerox/Weekly Reader has made a most auspicious entry into the "edutainment" software field. The Stickybear series of learning programs and the Bop game combine the highest quality programming with sound educational theory. The result is software that makes learning fun for all members of the family. The Stickybear programs will be a valuable addition to the software libraries of schools all around the nation and in the homes of parents who want to turn their Apple computers into powerful teaching tools. ☐



"Bad news dear. I've been replaced by Coleco-Vision."



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CIRCLE 109 ON READER SERVICE CARD

Growing Up Literate

Betsy Staples, Brian Murphy, and David H. Ahl

In the beginning were arithmetic programs. It was natural to look to the computer first for learning involving numbers, so the early educational programs for microcomputers were primarily arithmetic drill and practice.

As the industry has matured, computers have emerged from the arithmetic classroom and invaded every conceivable subject area from social studies to industrial arts.

Here we look at a collection of programs designed to help students in the language arts. Some of them are good examples of ways in which contemporary technology can be used to augment traditional teaching methods. A few serve to reinforce our oft-repeated caveat that just because it *can* be done doesn't mean it *should* be done.

Chambers of Vocab

"The time has come," said Tondor, "to test your powers in the great Chambers of Vocab.

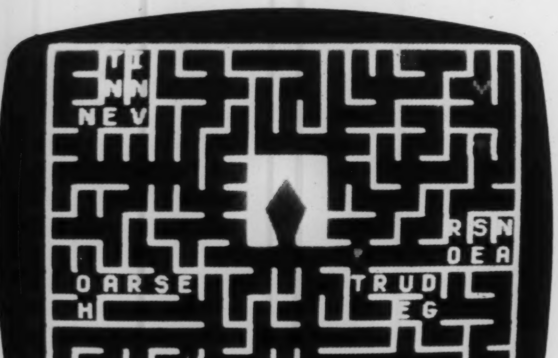
"You have excelled over all the others. Now you must face the final trial."

When I read those opening lines in the documentation booklet of *The Chambers of Vocab*, I was excited. "This should be good," I thought. "Probably a variation on the adventure theme with vocabulary words as the clues to help you out," I thought. "What a great idea!"

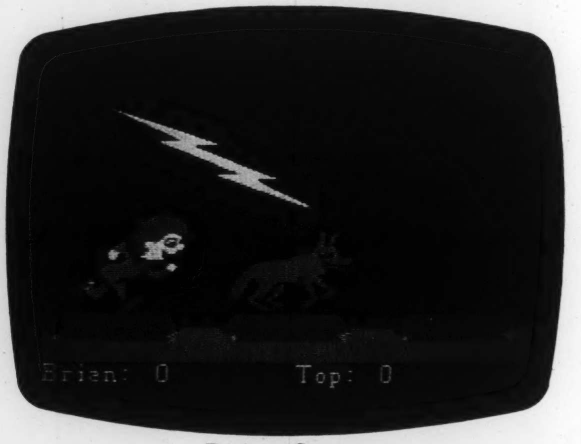
Yes, it was a good idea. Unfortunately, it was all mine. The authors of the package had something else in mind.

The Chambers of Vocab is basically a tedious maze game which doesn't even offer you the convenience of a joystick option.

You begin the game by typing in the names of up to four players and selecting one of three difficulty levels. The preliminary screens and instructions are very nicely done. You are presented with a choice of several options of which you choose one by pressing M to move the "choice bar" so that it highlights your selection. When you have positioned the



Chambers of Vocab.



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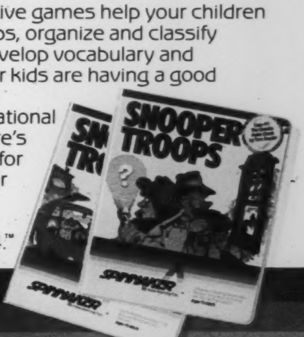

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choice bar correctly, you press C for Continue to move to the next screen.

After you have made the preliminary choices, you are asked to wait while the maze is formed. Why this should take so long, I don't know, because the maze is always the same.

Suddenly a maze appears on the screen. In the middle is a small figure (you). Scattered about in the maze are four small colored symbols, and floating around in other areas are four clumps of letters. The letters are the "word beasts" that you must capture.

To capture a word, you must first make your way through the maze to one of the symbols and touch it. This is more difficult than it sounds, because the only way to control your figure is by pressing the N, S, E, and W keys. To get an idea just how frustrating this is, configure your favorite maze to use those controls and see how long you last. Reader's Digest, unfortunately, has not provided the option to reconfigure the controls.

The other thing that makes running this maze tedious is the fact that your figure moves less than half an inch with each keypress, and you must wait until he stops moving before you can press again—even to keep him moving in the same direction. As you tap away on the illogically placed control keys, you begin to wonder if the game will ever end.

As you make your way around the maze, you must be careful not to collide with any of the word beasts. The beasts sort of slither through the maze, turning corners one letter at a time—which is to say very slowly. If you find yourself with a word undulating about between you and where you want to go, you have no choice but to sit and wait for the word to crawl by; there is only one way to get to any given point in the maze. To me it would have made more sense to have permitted the player to take another, perhaps, longer route to his goal instead of just standing in one place wasting time.

When you waste time, you lose points.

creative computing

SOFTWARE PROFILE

Name: The Chambers of Vocab
Type: Educational maze/word game
System: 48K Apple
Format: Disk
Summary: Tedious maze game with little educational value.
Language: Forth-79
Price: $48.95
Manufacturer:
Reader's Digest Services
Microcomputer Software Division
Pleasantville, NY 10570

There is a tally of "power points" at the bottom of the screen. These flicker away as you play, but there is no mention anywhere of their presumed function or of the rate at which they are consumed. Your score at the end of the game is the number of power points you have left after capturing all the beasts.

Which reminds me, we still haven't captured a beast yet have we? Well, after you touch one of the symbols, the screen changes and you see the definition of one of the roving words. You then see a display of all the words remaining uncaptured in the maze, another of those that have been captured, and a third of the score. Several times, I forgot the definition of the word while waiting for the game to cycle through the auxiliary screens.

The Chambers of Vocab *is basically a tedious maze game which doesn't even offer you the convenience of a joystick option.*

When you return to the maze screen, you must tap your way toward the word that has been defined. This is fairly easy, providing no other word blocks your path. If you touch any word other than your object word at any time, you are returned to the center of the maze to begin again.

Each game consists of three mazes each featuring four words. There is only one set of words for each difficulty level, but you can enter your own words and definitions right on the master disk—a very simple and well documented procedure.

The words in the third difficulty level are, indeed, more difficult than those in the first, mostly because they are longer. As such, they take longer to crawl out of your way and cost you more points, so it is more difficult to get a high score.

The Chambers of Vocab is not a great educational game. The game itself is not even entertaining enough to serve as motivation for drill and practice. There are several things that might have made it a better game, including the choice of reasonable control keys or a joystick option, the addition of an extra word in the maze to make the last capture something other than perfunctory, and the use of a more complex maze that would offer more than one path to the goal symbol or word.

As you may have guessed, I was very disappointed by *The Chambers of Vocab*; somehow I expected a great deal more from a company bearing the venerable name of Reader's Digest. *—EBS*

Trickster Coyote

A good tool for teaching vocabulary, at least for review and drill purposes, is the Reader's Digest educational program, *Trickster Coyote*.

No one should be surprised by Reader's Digest having produced a learning game like this. For years one of the most popular features in the magazine has been "It Pays To Build Your Word Power," a little game that has been subtly teaching remedial high school vocabulary to RD's readers for generations. *Trickster Coyote* is basically a colorful, computerized version of the same game.

The key word here is programmability. We can take the slick appearance of the high-resolution color graphics, the music, and the special effects for granted. They are not as important as flexibility in letting the teacher construct his own word lists and definitions to suit the needs of his own classroom. We shall see how this feature works in a moment.

As the program begins you are given the choice of entering words or playing the game. For those who want to try the game out right away, *Coyote* comes equipped with its own word list, divided into three levels of difficulty. Level one is suitable for elementary students. Level three is about right for middle school students.

You select words by the level of difficulty. You also have the option of playing with the words used in the last game or with a selection of eight words that the teacher has saved in advance. Before the game begins, you are given the option of a warm-up. During this phase, you can see the definition for any of the words in the game, a synonym, and an

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SOFTWARE PROFILE

Name: Trickster Coyote
Type: Vocabulary tutorial
System: 48K Apple II or II Plus, disk drive
Format: Disk
Language: MicroMotion Forth-79
Summary: Colorful vocabulary game a teacher can adapt to specific classroom needs.
Price: $48.95
Manufacturer:
Readers Digest Services
Microcomputer Software Division
Pleasantville, NY 10570

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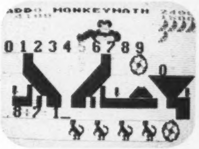

Monkeymath
by Dennis Zander

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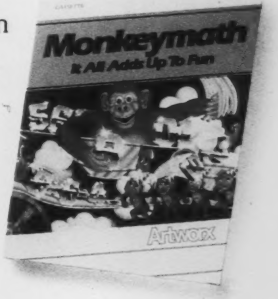

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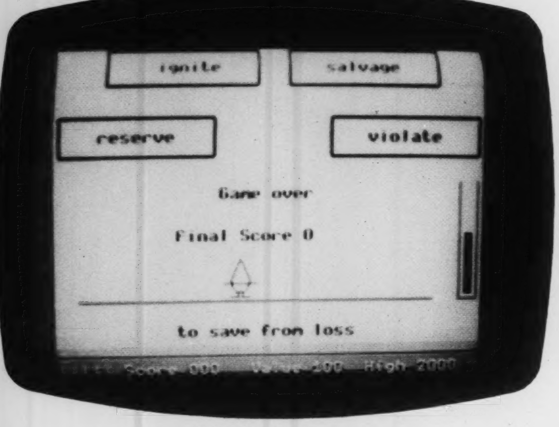
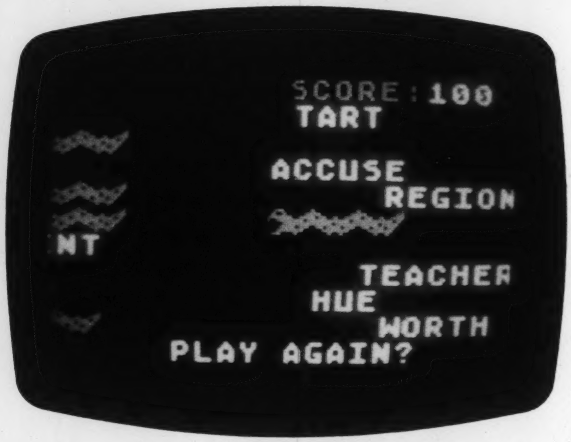


Word Attack.



Snake-O-Nyms.

example of the word used in a sentence.

Once you are familiar with the words, the game can begin. An animated boy, representing the player, chases a coyote across a bridge of floating logs on the hi-res video screen. At the upper left of the screen is a definition of one of the game words. The idea is to land the boy only on blank logs or on logs where the word correctly matching the definition is written. Landing on a log with a word not corresponding to the definition dumps the boy in the water. To pass those logs by, you must carefully time a stroke of the spacebar to get the boy to leap over the undesired word.

As the game progresses, the coyote changes into a rabbit, a raven, a buffalo, and a bear. Each change lets you know that you are progressing toward victory. If you can successfully evade all the coyote's traps, victory is signaled by an animation of the little boy dancing in triumph atop a totem pole while the coyote slinks away. In an optional "challenge round" the difficulty level increases, and some of the letters of the words are blanked out.

Another game option on the disk is Trickster Tag, a game which involves less eye/hand skill. In this game you get 10 seconds to memorize four words which are projected on the screen, then covered by images of the coyote. The definition of one of the words appears at the top of the screen. The four coyotes flicker, one by one, and it is your job to determine when the flicker is over the correct word. A score line at the bottom of the screen keeps track of right and wrong answers.

The fuel that powers these games is the word list which, as we noted before, can be added to by the teacher or by the student himself. Picking the "edit" option from the main program menu, allows the teacher to enter eight words at a time into the "personal word list." A teacher can use this feature to enter words from the current vocabulary unit or to individualize instruction for students in need of review work. The word list is saved directly to the disk, which is not write-protected.

The program is not really suited for testing for a grade, but it makes a very good reviewing tool, especially since it offers a teacher the ability to check the students' progress. The latest scores for up to four students can be stored on the program disk and can be accessed by student or teacher.

Trickster Coyote is well-designed educational software. Although the word list is adaptable to virtually any level of study, the juvenile theme of the game itself probably limits its application to elementary level students. Chances are that the kids on the middle and high school levels will find the game too cutesy. *—BJM*

Word Attack

Word Attack is a vocabulary building program from Davidson & Associates. It is structured logically, leading you from the introduction of the words to be studied to two quizzes and, finally, to an "arcade game," in which you use your new vocabulary to earn points.

At the beginning of the program you choose from levels 1 to 9, which are geared for students in grades 4 through 12. Levels 7, 8, and 9 are said to be appropriate for students preparing for the SAT. Next you select one of three word lists for your level: adjectives, nouns, or verbs.

You can choose to start with any of the four exercises, but it makes most sense to start with Word Display. Word Display displays a word, a synonym, or definition, and a sentence using the word. All displays in the program use upper- and lowercase as appropriate.

Once you have learned the 25 words in your word list, you can move on to Multiple-Choice Quiz which offers a multiple-choice question for each word. The word appears at the top of the screen, and below it are four numbered definitions (all of them from your list). You must choose the number of the correct definition. A counter at the lower right of the screen keeps track of the number of seconds it takes you to complete the quiz.

You can also choose reverse mode, which asks you to match the word to the definition. At the end of the quiz, you see your score and get a chance to repeat the words you missed.

By the time you get to Sentence Completion, you had better have a good command of your words, because this exercise asks you to fill in the blank in a sentence with one of your words. The definition appears at the top, but unless you have really learned your list, it can be difficult

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SOFTWARE PROFILE

Name: Word Attack

Type: Educational

Author: Janice Davidson and Richard Eckert

System: Apple II, IBM PC

Format: Disk

Summary: An entertaining and educational vocabulary builder

Price: $49.95

Manufacturer:
Davidson & Associates
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to recall the proper word. If you get stuck, you can ask for help, which consists of a list of four possible words. Of course, you must also spell the words correctly to get credit for an answer.

The last exercise, Word Attack, is the most fun. In it, you must use the arrow keys to move a little creature wearing a dunce cap back and forth at the bottom of the screen. Four words appear in boxes at the top of the screen, and a definition appears at the bottom. Your job is to position the creature under the correct word and fire his cap at it. There is a timer at the right, and you must shoot before time runs out.

At the beginning of the game, you choose one of three speeds which govern the amount of time you have to shoot. Words shot correctly at faster speeds earn more points.

You can earn extra points by shooting a bonus creature that periodically emerges from the lefthand side of the screen. All vocabulary fire is halted as you try to hit the bonus creature. If you are successful, you earn several hundred bonus points. The only problem is that if you use a rapid fire technique in trying to hit the creature, you can ruin your next vocabulary shot. If you press the fire key after the previous shot hits the creature, that shot will be suspended for a moment while your bonus score is displayed and then reactivated to hit whatever word is overhead. Occasionally, it happens that you hit the correct word by accident—usually you lose credit for the round.

Another bug in the program appeared during one of the quiz exercises. I had answered a few questions and then pressed ESC to exit the quiz. The scoreboard appeared with the report that out of three questions I had answered four correctly for a total score of 133%—quite a neat trick.

For the most part, *Word Attack* is a well constructed educational program. The quizzes and games are interesting enough to keep you motivated, and there is provision for adding your own word lists, complete with definitions and example sentences.

My only quibbles are with some of the word usages and definitions. In the interest of keeping definitions and example sentences short, the authors have sacrificed some of the nuances of meaning that make a rich vocabulary worth having. If, as *Word Attack* maintains, *bier* is just another word for *coffin*, why bother to learn it?

I was also a bit put off by a similar lack of precision in a few of the example sentences. "If a person dies intestate, he has no control over the distribution of his inheritance" is technically correct, but *property* or *estate* in place of *inheritance* would have done a better job of conveying the idea that I think the authors had in mind.

Of course, after you have mastered the 675 words that come with the program, you will want to enter your own words and definitions which can be as precise as you wish. Given this flexibility, I can recommend *Word Attack* for people of all ages who want a systematic and entertaining way to develop their vocabularies.
—EBS

Snake-O-Nyms

The hero is a frog; the villains are snakes. Sound familiar? No, it isn't Frogger, it's *Snake-O-Nyms* from EduFun, and for some of us it's more fun than Frogger, because the snakes don't win quite as often.

The object of *Snake-O-Nyms* is to find the correct synonym for the word that appears at the bottom of the screen. The possible matches—about 25 of them—scroll horizontally across the screen along with a collection of evil frog-eating snakes. Using the joystick for the Atari (or keyboard for the Apple), you guide your smiling frog face among the slithering meanies and press the trigger (RETURN key) when it is on top of the word you think matches the one below.

If you choose the correct word, your score is increased by 100 points, but you have no time to congratulate yourself. A new word appears at the bottom of the screen almost instantly, and the snakes and synonyms continue to scroll by. If you hit or are hit by a snake, you lose one of the four frogs with which you begin the game.

The alternate version of *Snake-O-Nyms* offers a series of antonyms. High scores for both games are saved to disk with the player's initials.

As the game begins, the snakes and words move very slowly. After your second match (200 points) they speed up to a reasonably challenging rate, and at 1000 points, they begin to move so fast that I found the game almost impossible. The documentation promises an extra frog and additional snakes at 2000 points—I wouldn't know; I never got that far.

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SOFTWARE PROFILE

Name: Snake-O-Nyms

Type: Educational game

System: 16K Atari, 48K Apple

Format: Cassette, disk

Summary: Nice combination of intellectual and arcade skills.

Price: $29.95 cassette, $32.95 disk

Manufacturer:
EduFun Division
Milliken Publishing Co.
1100 Research Blvd.
St. Louis, MO 63132

Snake-O-Nyms is a satisfying amalgam of intellectual and arcade skills. You must know the meanings of the words to choose the matches, and you must be able to guide the frog safely to the synonym (or antonym). There is enough skill involved to keep your interest even after the words become familiar.

Snake-O-Nyms *is a satisfying amalgam of intellectual and arcade skills.*

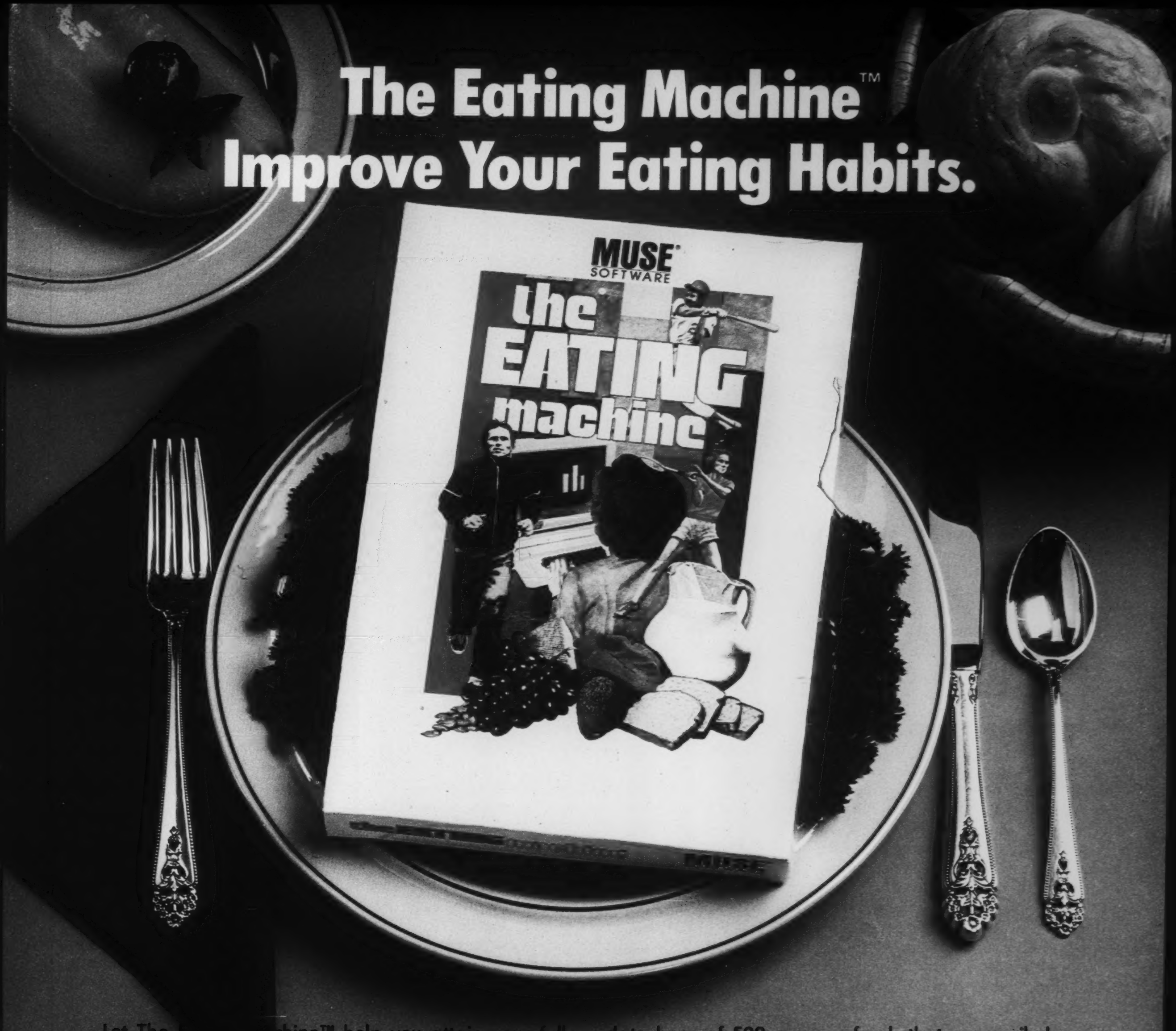
Word Flip, the second, totally different game on the disk is a Concentration type game in which you attempt to match words and endings. The game board displays 24 blocks lettered A through X. If you uncover two words or two endings, obviously, you get no points. If, however, you uncover a word and an ending, you must make a decision; you must indicate whether the pair is a match, not a match, or a match that results in a misspelling (teach+ed). In the last case, you must then type the correct spelling (taught). You earn 1 point for recognizing a nonmatch, 6 for recognizing a match, and 7 for re-spelling the word.

Again, the problem of displaying a misspelled word surfaces, but in this case, the word is on the screen for a very short time. As soon as it is identified as a nonmatch or misspelling, it disappears.

Unfortunately, there is no provision for adding your own words to either *Snake-O-Nyms* or *Word Flip*, so children will eventually master the material on the disk and move on to other challenges. This is the only significant shortcoming I found with the program.

An interesting feature of this package, which is obviously intended for home use, is the Manager record-keeping system included on the disk. With it, parents can keep track of the number of games played and the children's scores. Each play of the game is recorded with the player's initials, the number of attempts, and the number of correct responses. If nothing else, this feature should provide parents with an idea of how often the game is used.

The 11-page User's Guide begins with clear instructions for loading both Apple and Atari versions and provides brief but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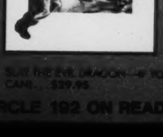
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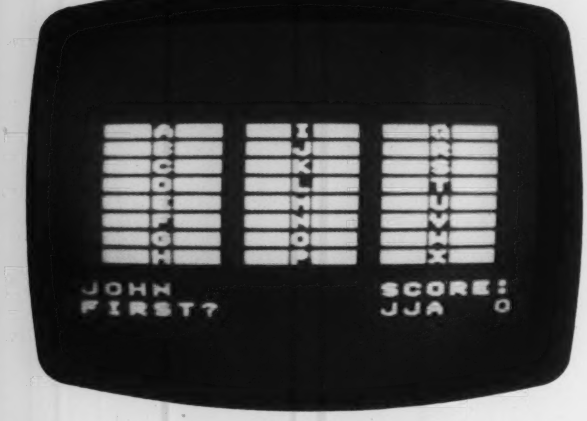

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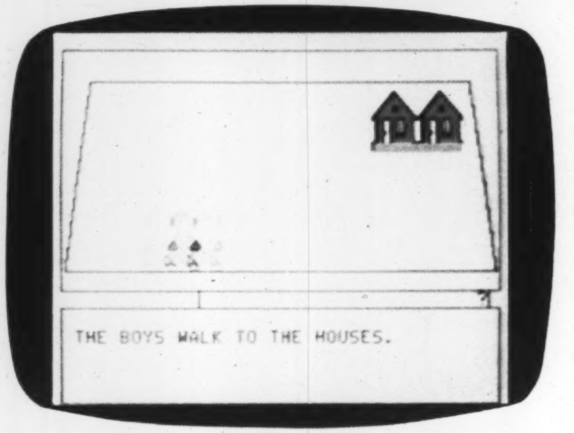

THE BOYS WALK TO THE HOUSES.

Story Machine.

adequate descriptions of both games. An interesting commentary on the state of computer assisted instruction is the section for each game that suggests to parents additional activities to reinforce the skills being exercised by the computer. EduFun suggests making flash cards on 3 x 5 file cards! —*EBS*

Story Machine

Story Machine is an educational game designed to help five- to nine-year-old children learn to write sentences, paragraphs, and simple stories.

Normally, upon loading the disk, you would select Option 1, Write Story. The screen is then divided into two parts, the lower third where you write the story and the upper two-thirds where the characters appear and the story is acted out.

For your story, you must use the *Story Machine* dictionary of 45 words. The 13 nouns and 10 verbs may be used in either singular or plural form. The dictionary is in the instruction booklet, on a laminated card, and can be viewed on the computer by selecting Option 2.

The rules for writing stories are simple. Each sentence must begin with an article, pronoun, or adjective. You must use present tense verbs (run, not ran). A prepositional phrase may not follow a verb. We found that these and the few additional rules were quickly learned by users.

If a sentence is not grammatically correct or if a word is misspelled or not in the dictionary, the computer draws a line through the mistake and erases it for you.

As you enter sentences, the computer animates them for you. For example, if you typed, "The boy runs to the apple," after typing boy, a small boy would appear on the upper part of the screen. Upon typing the period at the end of the sentence, an apple would appear and the boy would run to it.

As you enter sentences, the computer animates them for you.

Say you continued, "He eats the apple. The girl hops to the house." These actions would then be animated on the top of the screen. There are a few sentences that cannot be animated even though they are correct, for example, "The boy jumps the rock," or "To the house the boy jumps." We found that users quickly learned to avoid these constructions and the computer had no trouble animating all their sentences.

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SOFTWARE PROFILE

Name: Story Machine

Type: Educational Game

Authors: Clark Quinn, Margaret Weinstein, James Schuyler

System: 48K Apple, Atari 800, IBM PC

Format: Disk

Language: Forth

Summary: Write your own animated stories

Price: $34.95

Manufacturer:
Spinnaker Software
215 First St.
Cambridge, MA 02142

The computer also will not animate sentences in which the spatial relationship is inappropriate. For example, if the boy was not next to the apple when we told him to eat it in the first example above, the computer would reply, "Can't do it from here," or "must be closer."

Once users got the hang of the program, the next thing they wanted to find out was what happens when you do every single thing in the dictionary, but especially, what does the verb "zot" do. They also wanted to find out what a "Bumpus" was. We're not giving either one away.

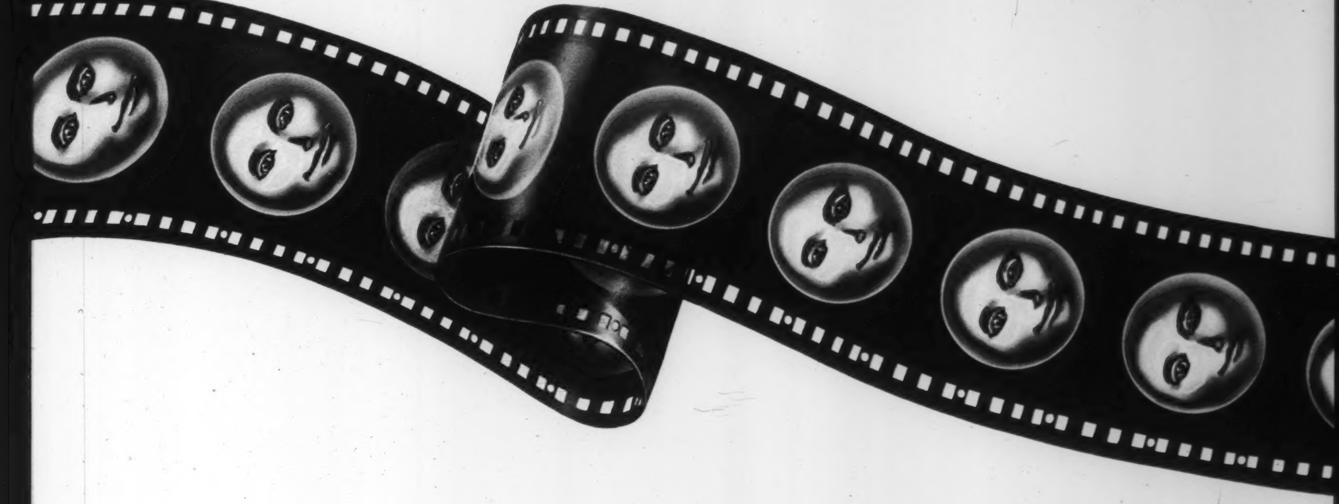
We found that different children responded quite differently to this package. Some wrote sensible stories that could really happen while others created amazingly bizarre events. Stories can be acted out over and over again, saved and retrieved on other disks, and altered by changing sounds or colors. The disk traps for incorrect input and did not bomb out or do anything unexpected.

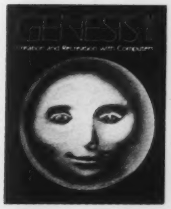
We felt that *Story Machine* was highly motivational and combined good, solid learning with the fun and excitement of a game. —*DHA*

Spelling Bee

For learners on the kindergarten through third grade levels, Edu-Ware's *Spelling Bee With Reading Primer* could make a valuable contribution to first lessons in language arts, provided that the teacher is willing to devote a little time to learning how to use the program.

For the child, this is virtually a turnkey system. He just turns the computer on and the game boots more or less automatically (the child must press one key to get the game going after the initial boot).

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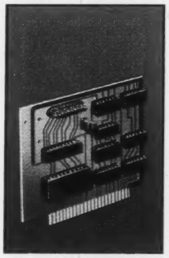

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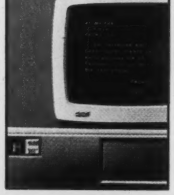

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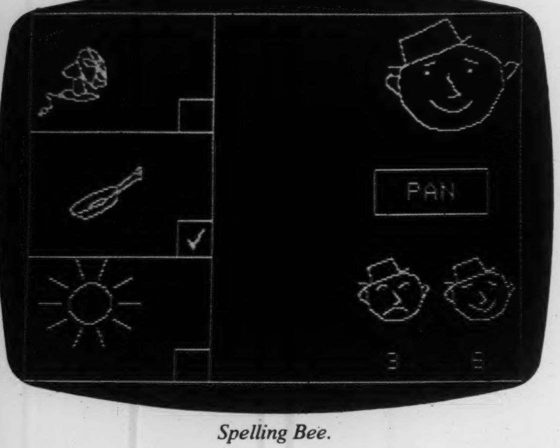
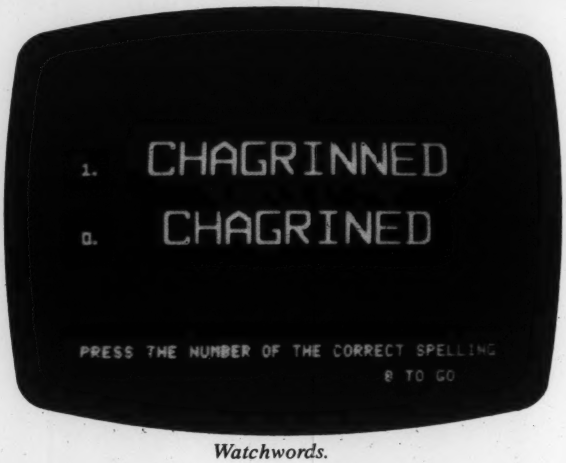


Spelling Bee.



```
1.  CHAGRINNED

2.  CHAGRINED

PRESS THE NUMBER OF THE CORRECT SPELLING
                                8 TO GO
```

Watchwords.

The *Spelling Bee* game is very simple. A picture is drawn on the black and white high res screen and the student keys in the appropriate response, such as *pin, door, belt,* or *dog.* For each correct response a smiling face grins and a lively snatch of music is played. A running score is kept at the bottom of the screen.

If the teacher desires, he can preset the program to run the Reading Primer. In this game three picures are shown on the left of the screen. To the right is a word matching only one of the pictures. The child uses the spacebar to toggle between pictures and the RETURN key to make his choice. Wrong guesses and correct answers are tallied on screen.

So much for what the child sees; now for the teacher's role.

The teacher, by hitting the right arrow key as the title page is displayed, can access several utility routines which allow him to shape the lesson. He can see the lesson material in advance and decide what words will be covered in the quizzing. He can look at the performance of the last person to use the program and see which words have been causing the most trouble. This is a very important feature in identifying the areas which need work. The teacher can also command the program to run the *Spelling Bee* tutorial which is a familiarization exercise for the student, rather than a game.

creative computing

SOFTWARE PROFILE

Name: Spelling Bee with Reading Primer

Type: Language Arts primer

System: 48K Apple II or II Plus, and disk drive

Format: Disk

Language: Applesoft

Summary: Entertaining games teach basic reading and spelling skills.

Price: $19.95

Manufacturer:
Edu-Ware Services Inc.
P.O. Box 22222
Agoura, CA 91301

Because the program depends on the pictures which accompany the words, you may not modify the subject matter to enter your own word list. In this respect, the program is more like a text book; you must decide in advance if the words in the word list are the ones you want to teach. Also, since the program requires that you take the time to review the student's performance after each individual session, it takes time to use it to its greatest potential. Without this close attention, the program can be used in a more passive role as a tool for drill, but you sacrifice the ability to monitor progress.

Spelling Bee is a great tool to supplement individual reading and spelling instruction. It would be especially effective in a setting where the teacher is assisted in the classroom by a paraprofessional or in a team teaching setting. Then the teachers can determine which students will use the program and give them the individualized attention needed while the rest of the class concentrates on other activities.

In the final analysis, none of these programs actually automates the learning process. The role of the teacher is still paramount in providing motivation, guiding the lesson, and evaluating the results. What these programs do is what they were meant to do: they provide teachers with tools to help students learn. *—BJM*

Watchwords

I used to be a good speller. Then I became an editor. Now I see so many misspelled words every day that I am forced to look up words to which I would never have given a second glance before. That is why I object to any exercise that uses misspelled words in its format.

That is why I question the pedagogical philosophy behind *Watchwords* by Micromedia Software. The essence of *Watchwords* is the selection by the student of the correct spelling of the word being practiced. Obviously, for there to be a correct spelling to choose, there must be an incorrect spelling to not choose—that is the problem, and that is why I cannot recommend *Watchwords.*

You, however, may disagree with me, assuming perhaps that your child is smarter than I am and will not be adversely affected by constant viewing of misspelled words. For you, I continue this evaluation.

The program itself is basically well constructed. Required responses are consistent—always a number not followed by RETURN; there is ample opportunity to correct your errors before they are entered; and the rules can be changed to suit a student's needs.

The *Watchwords* package includes a program disk, a "wordisk," and an 8 1/2" x 11" typewritten manual. You load the program from the program disk and are then given an opportunity to modify the rules. The most significant options are those that govern the typing of the word. You can choose simply to select the correct spelling and go on, to select the correct spelling and then type the correct word, or to see only the correct spelling and type it.

Other options concern time limits, the number of words that will be presented, and the number of words that must be

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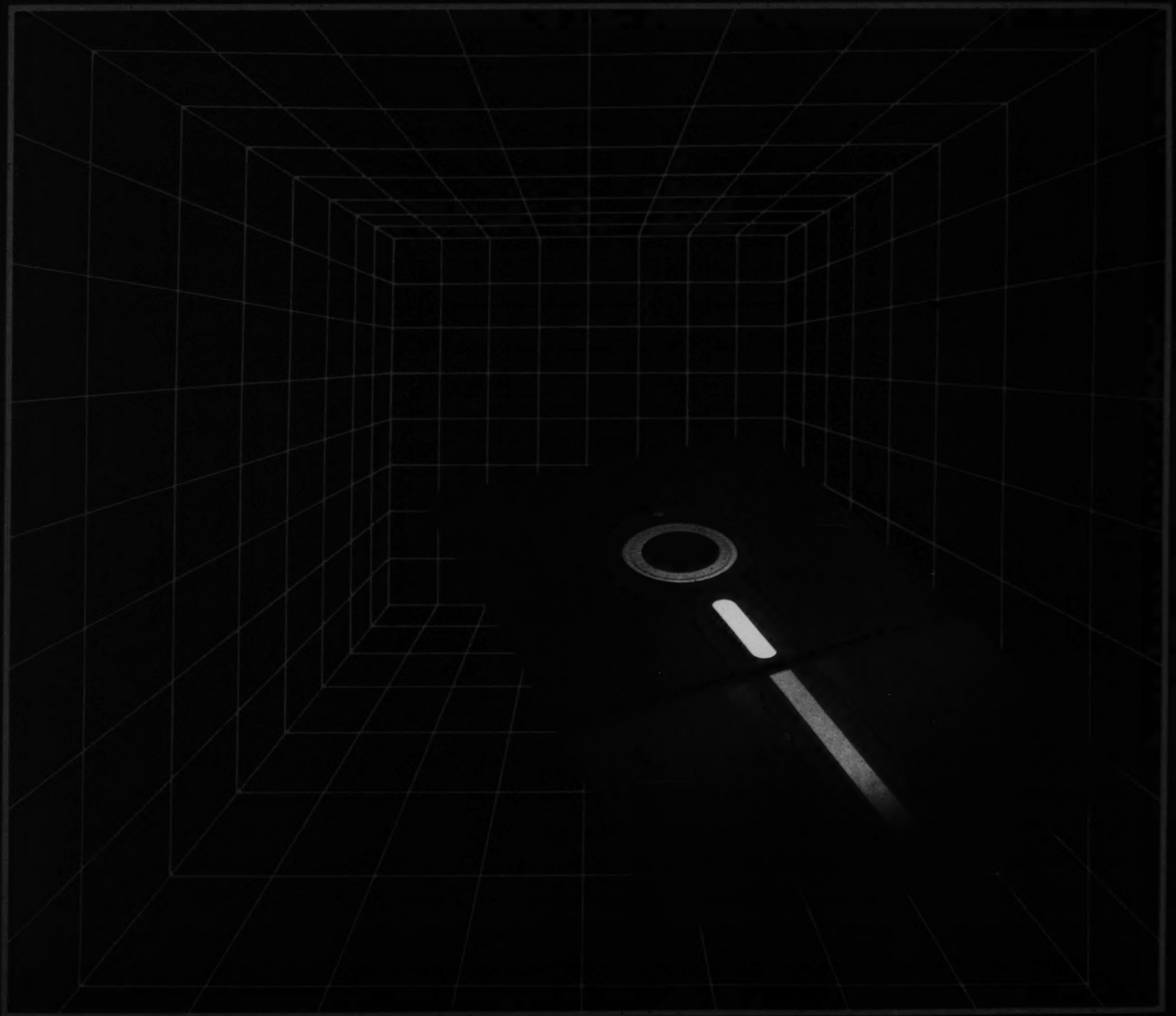

CP/M is a trademark of Digital Research, Inc., MS DOS is a trademark of Microsoft Corporation, PC DOS is a trademark of IBM Corporation, Victor is a trademark of Victor Technologies, Inc. © 1983 DATA BAS[illegible] spelled correctly before you advance to the next level.

As you begin to play, you type in your name (if it has fewer than nine letters—poor Christopher), choose your starting level, and specify whether or not you want sound (the sound is so innocuous that it is actually more bothersome to have to keep answering the sound on/off question than to listen to the modest little beeps).

The next screen displays two words in hi-res graphics—all lowercase letters. You press 1 or 0 to indicate which is spelled correctly. If you have selected the type-in option, you must then type the word correctly.

If you make a mistake and select "natoin" instead of "nation," the incorrectly spelled word disappears, leaving the correct one on the screen. A few seconds later, both words reappear and you choose again. You are not scolded, or even told that you were wrong; you simply have to choose again. If you are even moderately clever, you should be able to guess correctly the second time. If you don't, however, the sequence repeats itself, and will continue to do so until you get the plagued thing right.

After you have completed ten words (or the number you specified when setting the options), you get a report on your performance expressed as a percent correct, and you find out whether you can continue to the next level. At the end of level 9 (or sooner if you elect to quit) you may choose to have the results of your session printed out—a feature that will be appreciated by classroom teachers.

When you have mastered the 540 words on the supplied wordisk, you will probably want to add words of your own. To do this, the manual tells you, you need *Wordisk Maker*, a program that, unfortunately, is not included in the *Watchwords* package. Instructions for using *Wordisk Maker* are included in the *Watchworks* manual as is an order form which along with $29.95 will get you the disk. Backup disks can be ordered for $9.95.

creative computing
SOFTWARE PROFILE

Name: Watchwords
Type: Educational
System: 48K Apple II or IIe
Format: Disk
Summary: Has serious pedagogical and marketing flaws
Price: $59.95
Manufacturer:
MicroMedia Software
276 Oakland St.
Wellesley, MA 02181

I think this is a bit much. For $59.95 you ought to get a complete package. It is quite fair to expect any vocabulary or spelling package to include a means of adding additional words. Discovering halfway through the manual that you must shell out another $29.95 if you want a really useful program is like finding out on your way home from the showroom that the brakes for your new car were an option you neglected to order.

If you are even moderately clever, you should be able to guess correctly the second time.

The manual is thorough and complete. All the information you need to use the program is included along with a set of educational objectives (reinforce recognition of correct spelling and provide familiarity with the keyboard). You do not, however, have to wade through the instructions to play the game in its default mode. Just booting the program disk and following the instructions will have you playing in short order.

Using *Wordisk Maker* is quite easy. The program offers clear instructions which are reinforced by the manual. The bad news is that you must be prepared to enter between 68 and 100 words for each of the nine levels—quite an undertaking.

After you type in the correct spelling of a word, you may choose either to enter your own misspelling or to have the program create one for you. I strongly advise the former, because the program simply transposes a random pair of letters; *residual* becomes *rseidual*, for example—and even I have no trouble choosing between those. —*EBS*

Word Division

Another language art package for the elementary grades is *Word Division* by Ahead Designs. This is a program designed to reinforce skills in identifying compound words and recognizing suffixes and prefixes. This, in turn, helps the student in spelling and in usage.

The game the program employs to do the actual teaching is very simple. Using paddle 0 you position a little marker on the high-resolution color display under the word to be divided. By pressing button 0 you "shoot" a line between letters. If you have made the division correctly, your score is recorded, and the next word comes up. There are ten words to a level and four levels to a round.

That is the game in a nutshell. Using a security code, the teacher can modify this game at will. The disk comes with several word lists totaling 1600 entries. The list is divided into four word groups of 400 each.

File A contains words for practice in identifying compounded words such as *classroom* and *schoolbooks.* In file B are more compound words mixed this time with non-compound entries (you move the marker off to one side and then fire for this sort of word).

File C covers suffixes *ed, ing, er, ly, es, y, ment,* and *s* and prefixes *a, al,* and *be.* File D covers prefixes *re, un, mid, mis, de, dis, en, fore, non,* and *sub.* D also drills on the *age, est, en, ful,* and 16 other common suffixes.

The program has many nice features. One is that the teacher's security code keeps the student out of word files where mischief can easily be made.

You can add your own word lists to the disk as needed. You must add 400 words at a sitting, however, so plan carefully and be prepared to spend an hour or so keying in your word list. This feature enables you to use the software to support virtually any text or curriculum materials.

Other features include a "grade book" which allows you to monitor the progress of as many as 30 students. Since the system is virtually tamper-proof, you could use the program to develop grades for students.

Other program routines allow you to set in advance the word list to be used in the quizzing. You can also modify the time limits allowed for responding to each word (you can gradually shorten the limit as skills sharpen) and to backup wordfiles on extra disks.

This is not glossy, glamorous soft-

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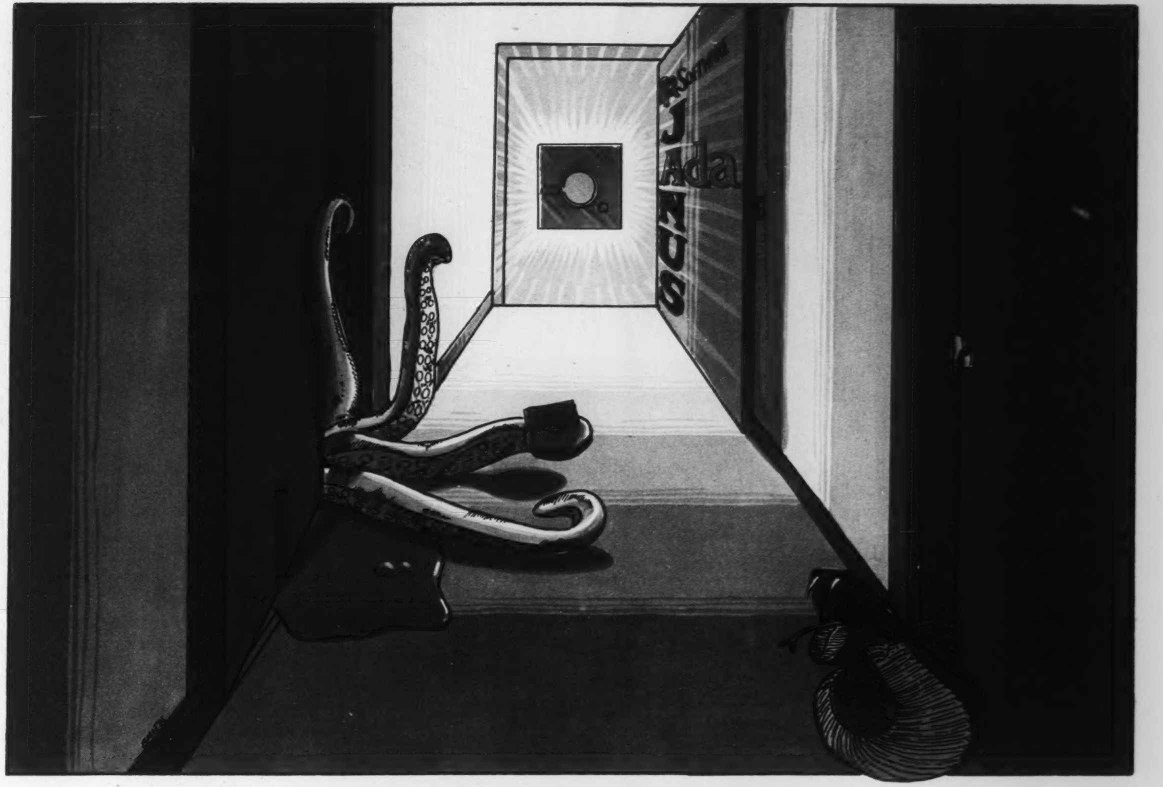
SOFTWARE PROFILE

Name: Word Division
Type: English tutorial
System: 48K Apple II, II Plus, or IIe and disk drive
Format: Disk
Language: Applesoft
Summary: Game effectively promotes recognition of prefixes and suffixes.
Price: $19.95
Manufacturer:
Ahead Designs
699 North Vulcan #88
Encinitas, CA 92024

THE EASY CHOICE



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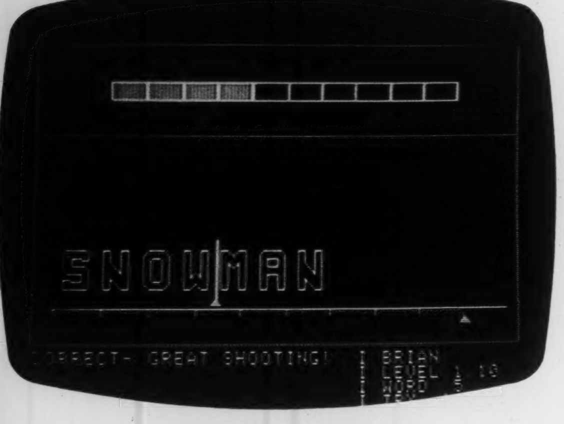
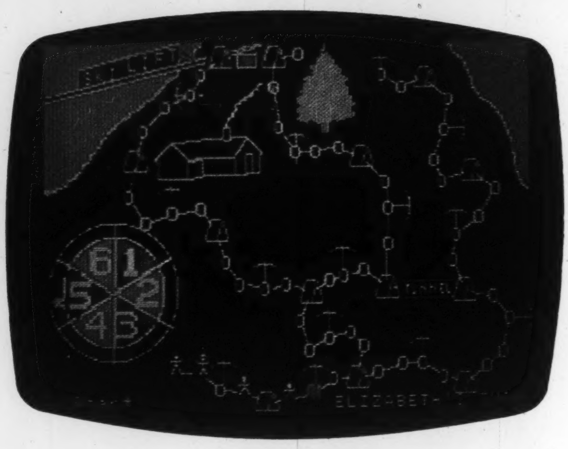


Word Division.



Cause & Effect.

ware. The graphics are minimal, and there is little of the "arcade excitement" cited by some educational software makers. What recommends this game to teachers will be its versatility, adaptability, and flexibility in supporting lessons in this limited area of language arts.

As for the ability of *Word Division* to hold student interest, that is an open question. To keep interest high, I would organize the class into teams and conduct competitions. *—BJM*

Cause And Effect

Teaching children to read is not easy, but teaching them to comprehend what they are reading is even harder. After all, for comprehension to develop, the child must really *care* about what he is reading. That means the child must be motivated to read.

Two Apple reading comprehension games aptly designed to motivate young learners are *Fact or Opinion* and *Cause and Effect* from Learning Well. They provide motivation through play and competition.

One of the advantages these games offer in a classroom setting is the multiple player feature. The games are designed for play by from two to six students. This means that the teacher can place several children at the computer at a time and cycle the entire class through the computer station more frequently.

Another advantage of these games is that they place the kids in direct competition with each other. Nothing creates so much positive excitement in a classroom. If the teacher is careful to group the children by ability (to avoid one or two brighter children dominating the group) and is willing to put up with the noise of the children as their excitement for the competition grows, he will have little or no difficulty motivating his charges and in getting the maximum value from both games.

Without preparation, the student might find* Cause and Effect *and* Fact or Opinion *a frustrating experience.

The object of *Cause and Effect* is to get to the top of a mountain displayed on the hi-res color screen by following one of several trails winding up the side of the peak. Progress is regulated by a graphics "spinner" which allocates the number of spaces a player can move (1 - 6) during the current turn. Along the way the players wander into campsites, where they find paragraphs to read. After each paragraph a question is displayed for the player to answer, requiring him to identify a cause and effect relationship outlined in the paragraph.

Here is an example: One paragraph describes how a handsome prince discovered the girl he had fallen in love with the night before at the ball. He matched her foot to a glass slipper she had left behind when she rushed home suddenly. Having read the paragraph, the student is then told that the "effect" shown in the paragraph is the prince finding Cinderella.

The child is then given three '"causes" to choose from. The correct cause, of course, is that the glass slipper fit Cinderella's foot. Having answered the question correctly, the player is rewarded with an extra space forward on the trail.

From time to time the player lands on a space marked by a climber's pick. When that happens, he receives a cause and effect message such as "Cause: You slept late. Effect: You lose one turn." This is a good elaboration of the theme, and reinforces the thinking skills the players need to identify the cause and effect relationships in the paragraphs.

When one of the climbers makes it to the summit, the game ends with a flourish of music and an on-screen announcement of the winning player's victory. This is a reinforcement that stimulates the kids to play on. The music also signals the teacher to come to the computer station to examine and record the scores and to organize the next program run.

Each child's performance in interpreting the paragraphs and answering the questions correctly is expressed in percentage form, with a flawless performance equaling 100%. A tally is also kept of the number of questions answered correctly and incorrectly. If a printer is part of the system, the teacher can choose to make printed copies of those scores. *—BJM*

creative computing
SOFTWARE PROFILE

Name: Cause and Effect

Type: Educational

System: 48K Apple II, IIe or II+ with disk drive

Format: Disk

Language: Assembly

Documentation: Excellent

Price: $49.95

Summary: Good game to foster analytical thinking in young players

Manufacturer:
Learning Well
200 South Service Rd.,
Roslyn Heights, NY 11577

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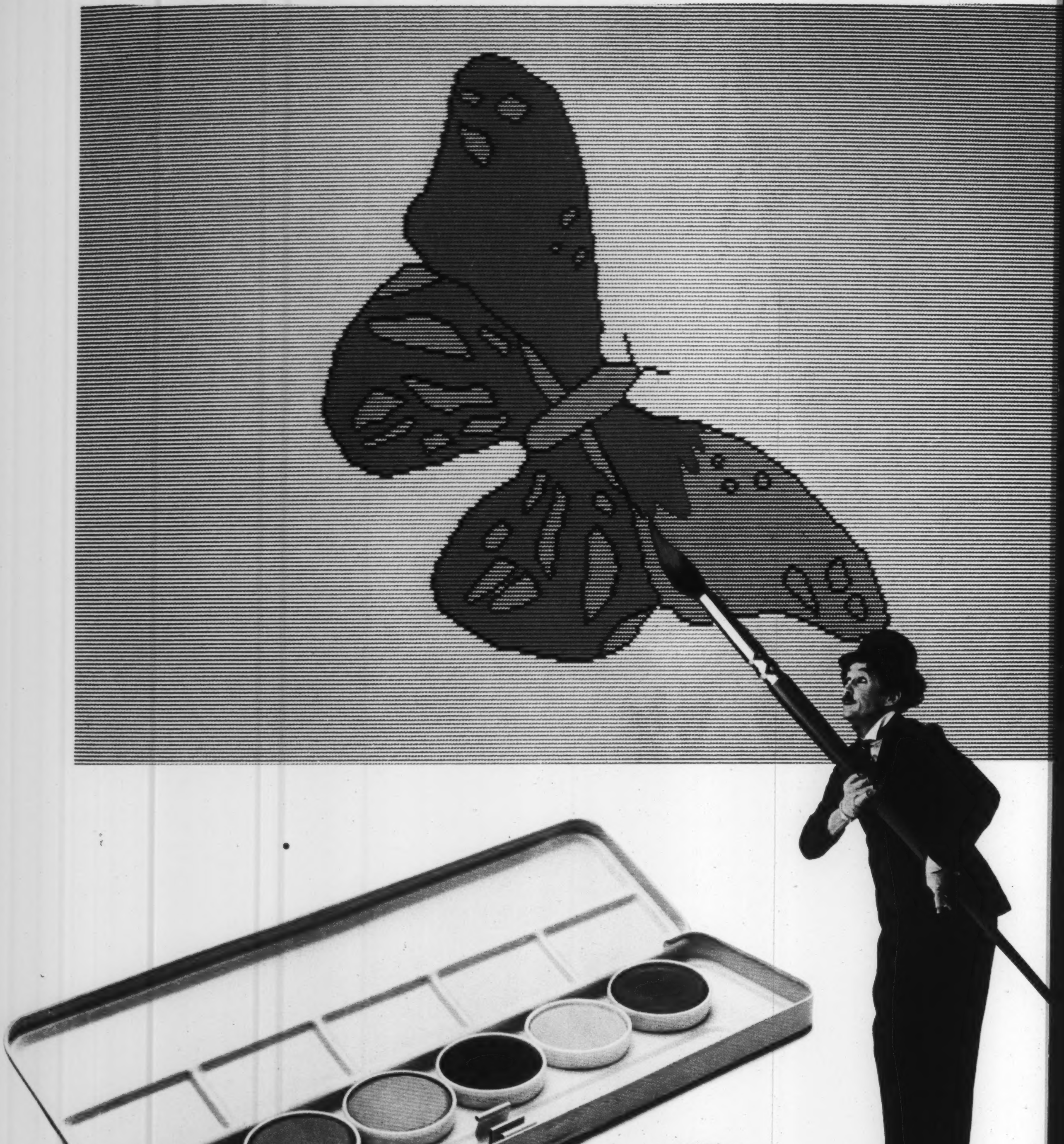

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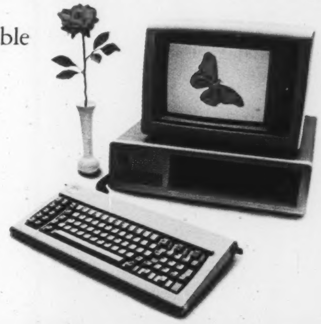

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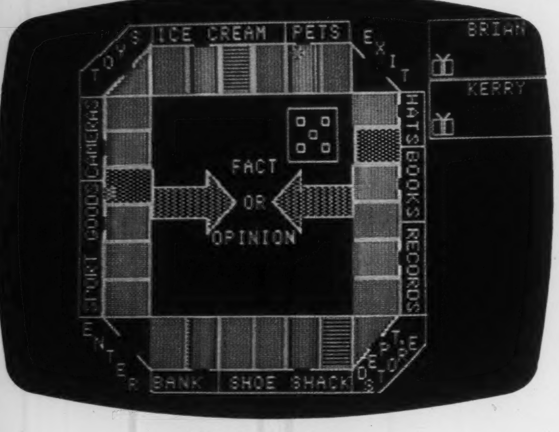
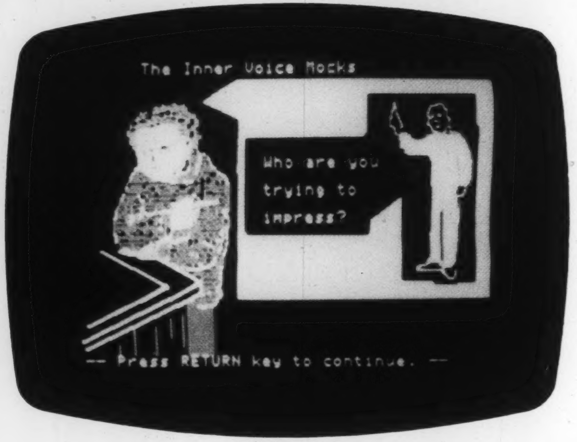


Fact or Opinion.



The Inner Voice Mocks

Who are you trying to impress?

-- Press RETURN key to continue. --

Wordy.

Fact Or Opinion

A delightfully contemporary setting—a shopping mall—is the arena of competition in *Fact or Opinion*, a reading comprehension game which helps develop the useful skill of making distinctions between factual statements and "puffery" in advertisements and which prepares the student to examine what he reads with a critical eye.

In this game the object is to collect five presents at the hi-res mall and to exit ahead of the other players. The number of squares the player travels around the Monopoly-style playfield is determined by throw of a video die, on which the spots disappear as the player uses up his move.

If he lands at the entrance to a store, the player has an opportunity to win a present by reading a paragraph of advertising and then identifying which parts of it are statements of fact and which are statements of opinion. On some squares, instead of being given a paragraph to analyze, he is shown three sentences and asked to choose the one which is either fact or opinion.

Creative Computing
SOFTWARE PROFILE

Name: Fact or Opinion
Type: Educational
System: 48K Apple II, IIe or II+ with disk drive
Language: Disk assembly
Documentation: Excellent
Price: $49.95
Summary: Great learning game; teaches critical thinking.
Manufacturer:
Learning Well
200 South Service Rd.,
Roslyn Heights, NY 11577

A few of the paragraphs, being simple listings of merchandise for sale and prices, should be easy to interpret as fact. Other paragraphs are constructed more subtly and require more thought. Some of the paragraphs, for example, consist largely of questions which the student must learn to disregard, since they are neither fact nor opinion.

Some of the paragraphs are sheer opinion, but stated in a very assertive and positive manner. It will be hard for some students, at first, to identify opinion that is stated so aggressively. "You can have a really great date whenever you want one. We can match you with the right person. You need not be lonely ever again." This is opinion, of course, but many grownups might be unable to tell the difference. With enough practice playing this game a child should be able to spot the criteria which separate opinion from fact. The skills learned will enable the student to make critical judgments in his other readings.

The game ends when one of the students succeeds in making an exit from the shopping mall. Again, music signals the teacher to come to the computer station to check the scores. The tallies are kept in the same manner as *Cause and Effect*, with the same printout capability.

It is obvious that before these games can be used effectively there must be a program of supportive classroom instruction. Without the right preparation and advance skill-building, the student might find *Cause and Effect* and *Fact or Opinion* a frustrating experience. On the other hand, if the teacher plans carefully, the games can find a place at the center of a complete unit combining reading comprehension with an introduction to critical thinking.

One of the few weaknesses of these two programs is that they are not modifiable. Were the teacher to have the ability to supply the paragraphs used in the questions from texts or other classroom materials, the games could be linked more closely with the established language arts curriculum. It would also enable the teacher to grade the difficulty of the paragraphs and questions to match the exact needs and skill levels of the students.

The games are available in two versions. The Red Level versions are for students with reading abilities typical to Grades 2 to 3.5. The Blue Level games are geared for Grades 3.5 to 5. Used thoughtfully and with the careful preparation, *Cause and Effect* and *Fact or Opinion* can earn a useful place in any elementary reading program.—*BJM*

Wordy

Wordy from ComPress is a program I would like to be able to require all prospective contributors to *Creative Computing* to use. *Wordy* attempts to teach style by attacking some of the most common stylistic mistakes that writers make—mistakes that have made their writing wordy.

The eight ills that the program treats are circumlocutions, redundancy, *it is* constructions, weakening intensifiers, unnecessary *is* and *are* forms, vague expressions, pretentious diction, and elaborate constructions.

On each of the three *Wordy* disks is a general introduction to wordiness and a menu that lists all the lessons in the package. If you choose a lesson that is not on the disk currently in your drive, *Wordy* tells you which disk to insert.

Each lesson begins with a description of the kind of wordiness under consideration and several examples. Then follows

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a cute graphic which shows a young writer reconsidering his choice of words—he has a very astute "inner voice" that reminds him that conciseness is next to godliness. All of the example and exercise sentences are complex and interesting; most of them treat social studies topics.

The exercises take several forms. The simplest is a choice between two sentences in which you choose the less wordy of the two. The second form offers a sentence, each word of which has a number suspended over it. You type in the numbers of the words which begin and end the wordy phrase. This technique is somewhat less satisfactory than the first, because it is sometimes difficult to know just how much of the phrase the author wanted to include in the correct answer, and there doesn't seem to be any flexibility in the correct response; you either choose exactly the words the author chose or you don't get credit for the exercise. You do get a second chance to type the correct numbers, but by then your score is shot.

The least satisfactory of the three formats requires you to retype a wordy sentence, wording it so as to avoid the pitfall being studied. Although this makes the most sense from the standpoint of learning the material, it is very frustrating for the student. As in the second format, there is no flexibility in the response; you must type exactly what the author wants—there is only one correct answer.

Unfortunately, neither editing nor writing is an exact science, and it is quite possible to find more than one acceptable way to reword a sentence. It is even more possible to make a typing error (such as forgetting the period at the end of the sentence) that will strip you of all credit for the exercise. If your first answer is wrong, you must retype the entire sentence (some of them are quite long). I feel strongly that the author should have allowed for, at least, a typing error or two when specifying the answer.

creative computing
SOFTWARE PROFILE

Name: Wordy

Type: Educational

Author: Priscilla Sears

System: 48K Apple

Format: Disk

Summary: A very good introduction to wordiness.

Price: $100 for 3 disks

Manufacturer:
ComPress
P.O. Box 102
Wentworth, NH 03282

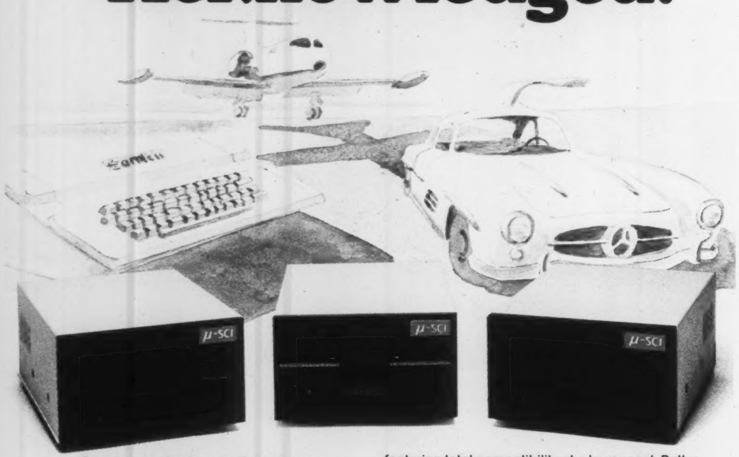
My only other criticism of the program is that there are not enough exercises. In addition to the explanation and examples, each lesson offers only five or six exercises—not quite enough to fix the concept firmly in your mind. A minimum of ten exercises per lesson would be better.

At the end of each series of exercises, the program repeats the exercises you did incorrectly, and then presents your score as a percentage on a horizontal bar. As you can guess, with so few exercises all of which demand perfect answers, it is very difficult to get a good score.

The high price of *Wordy* probably makes it most appropriate for use in schools and libraries where students can work on the short lessons as time permits. The disks are copy-protected, and back ups are available for $10.00 each.

All in all, ComPress is on the right track. The concept behind *Wordy* is excellent and just a little more programming sophistication would make the entire program an outstanding contribution to the body of educational software. —*EBS* □

Excellence Acknowledged.



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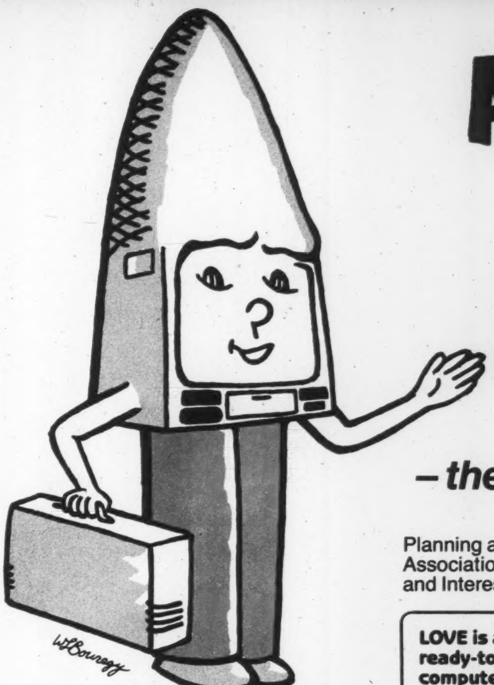

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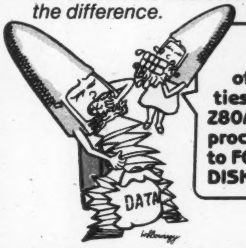

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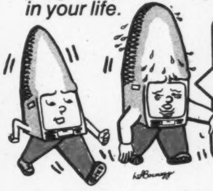

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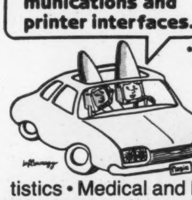

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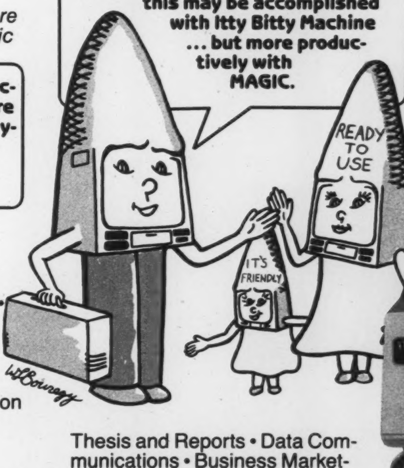

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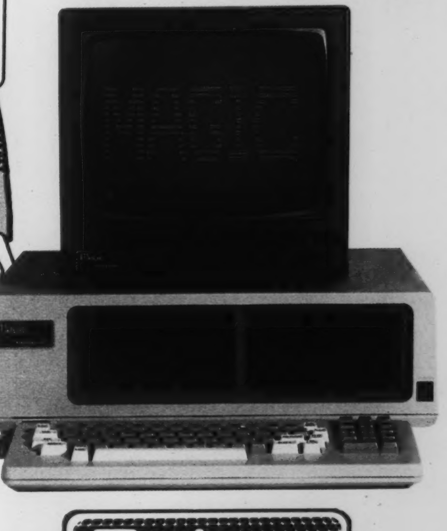

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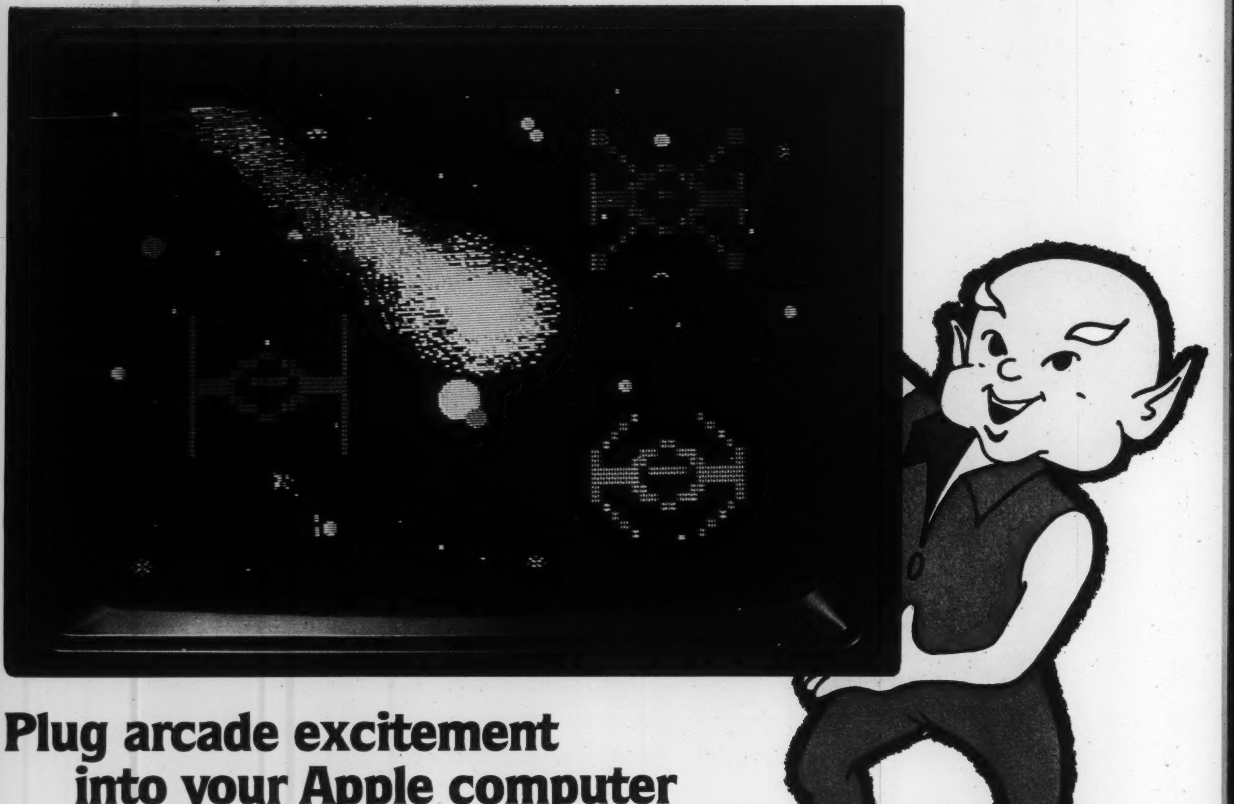

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adventures in education

Graham Unwin

Role playing with a computer is but one way computers can be used as educational tools in the home and classroom. Adventures and simulations allow the student to assume a new identity and experiment with different kinds of behavior and unusual situations.

These adventures can be historical simulations, present day mysteries, science fiction projections into the future, or completely fanciful excursions into settings of indeterminate chronology. All require thinking, planning, strategy, and patience if the player is to succeed.

As a teacher who is constantly looking for educational value in the activities my students enjoy, I find that adventures and simulations offer positive learning experiences. As a young person plays an adventure game, he develops such important skills as spelling, reading comprehension, critical thinking, and creativity. He must analyze a situation and act in a manner consistent with the rules that he has learned govern his environment. Often, his understanding of historic and scientific events is broadened as he copes with unfamiliar situations.

Each game has certain objectives which may or may not be apparent as play begins. The writers of adventures are extremely clever at devising schemes and patterns which can be uncovered only through perseverance and systematic experimentation. Young people derive a great deal of satisfaction from attacking a task and sticking with it until the problem is solved.

They also enjoy participating in an ongoing story in which they are the characters who determine what happens next. The experience is completely different from the passivity of TV viewing or the physical involvement of arcade game play.

From an educational standpoint, participating in a good adventure serves as an effective introduction to the computer as a complex information processing tool that is easy and fun to use. The experience helps the student learn how to organize information as it demonstrates the abilities and limitations of the machine. Many students are inspired to learn more about the computer and eventually become accomplished programmers.

Students also appreciate the exploratory nature of adventures which creates a sense of suspense and anticipation. Because one false move can bring about the demise of one's character in a moment, each move involves risk and must be made after carefully considering all the

---

Graham Unwin, 150-15 79th Ave., Flushing, NY 11367.

possible consequences.

As every computer enthusiast knows, there are many adventure packages on the market today. They are available for virtually every computer from the tiny Timex Sinclair 1000 to the mighty, all purpose CP/M system. They are also among the more expensive game packages available, so care must be taken in choosing the ones that will work best in the educational environment.

When I began using adventures in the classroom, I found that different programs were appropriate for different situations. A program that did not work well in the classroom might be quite effective as a teaching tool at home.

In my classroom, I scheduled computer adventure sessions during recesses, before school, and after school. After more than a year of experimentation, my team of 10- to 13-year-old experts has come to some important conclusions about many of the packages currently on the market. The remainder of this article is a discussion of their opinions and conclusions.

Wizardry

Wizardry, one of the most popular fantasy role-playing games around, allows several characters to travel together through an underground maze full of mystery and danger. Travel is guided by a three-dimensional representation of the maze, and the actions of the characters are influenced by a multitude of variables, only some of which are under their control. The unique mix of text and graphics and the character development offered in *Wizardry* capture and hold the interest of most students.

The game requires a great deal of strategic planning. Schemes must be conceptualized and tried. If they work, the rewards are immediate: the character is improved, a treasure is uncovered, or a needed item is found.

The other unique and appealing feature of *Wizardry* is its multiplayer format. It is the only game we have tried that allows several players to become involved in the game, each with his own character. Players must cooperate in sharing record keeping responsibilities as well as ideas and strategies. *Wizardry* encourages social interaction, cooperative behavior, and active dialogue. It is difficult but not impossible; continual progress spurs the player on.

Hi-Res Adventures

Another series of adventures popular with my students are the Hi-Res Adventures from Sierra On-Line. The series includes five regular adventures and one super epic called *Time Zone*.

It is best to start with one of the earlier games such as *Mission Asteroid* or *Mystery House* and work up to the more complex *Cranston Manor, The Wizard and the Princess, Ulysses and the Golden Fleece*, and *Time Zone*.

In *The Wizard and The Princess*, the goal is to save the life of a princess in a castle far away. This is not an easy task, and the problems encountered along the way call for some serious, flexible thinking. The game is good for a group, because the more people there are, the better are their chances of hitting on the correct solution.

Sierra On-Line also offers *Dark Crystal*, a hi-res adventure based on the movie of the same name.

A factor that must be considered with these and other adventures is the amount of frustration they induce. Beginning adventurers frequently reach an impasse and can spend hours trying to overcome a single obstacle. The most effective way to deal with this problem in the classroom is to have a more experienced adventurer available to provide hints when the action bogs down.

Adventure International

Scott Adams of Adventure International has written more than a dozen text adventures, most of which have recently been converted to include graphics. *Adventureland, Pirate Adventure, Mission Impossible*, and *Strange Odyssey* are the favorites in my classroom. All are now available in graphic form for most computers.

Scott Adams adventures are known for the tricks and puzzles which players must solve to progress. These can keep groups of students busy for hours.

Adventures for Beginners

Phoenix Software, recognizing that it often takes a player a while to learn the techniques of successful adventuring, offers a tutorial adventure called *Birth of the Phoenix*. My students found this approach very helpful, and enjoyed playing the game, too.

Other high quality adventures from Phoenix Software include *Adventure in Time, Queen of Phobos*, and *Sherwood Forest*, an animated adventure that puts the player in the role of Robin Hood.

The Snooper Trooper games from Spinnaker Software are also good adventures for beginners. Written specifically for young people, *Granite Point Ghost* and *Disappearing Dolphin* are intended to be educational. The student plays detective and must try to solve a crime; suspects can be interviewed and clues uncovered. Snooper Troopers have provided many hours of challenging fun in my classroom.

Infocom

The adventures from Infocom are in a class by themselves. *Zork I, II*, and *III, Starcross*, and *Suspended* feature fantasy/science fiction scenarios that require a great deal of experience and determination. *Deadline* and the new *Witness* cast the player in the role of a detective whose task is to solve a crime before time runs out. They are very realistic and include complex vocabularies.

In terms of innovative designs and verbal interaction, Infocom is the leader in the field.

Ultrasoft

Mask of the Sun by Ultrasoft is another very challenging adventure. It requires the player to explore Aztec ruins for artifacts that are the key to his survival. The game is difficult, but the writers have taken care to provide enough information at each location to avoid total frustration.

Mask of the Sun, like the Infocom programs, is noted for the flexibility built into its vocabulary. With these games, adventurers can spend more time exploring ideas and less time searching for word combinations the program will accept.

Sword Thrust

Some of the students were particularly partial to *Sword Thrust*, a sophisticated version of an older text adventure called Eamon. *Sword Thrust* allows the player to create a character which he then stores on disk and uses in different scenarios. As the character progresses through a scenario, he gains experience and skill which he can use in future games.

Titles in the *Sword Thrust* series include *Vampyre Caves, Case of the Sultan's Pearl*, and *The Green Plague*.

Sirius Software

Sirius has released an adventure which my students found very difficult, but attractive, nevertheless, because of its ani-

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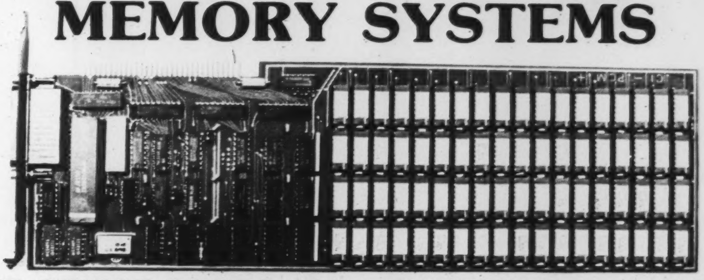

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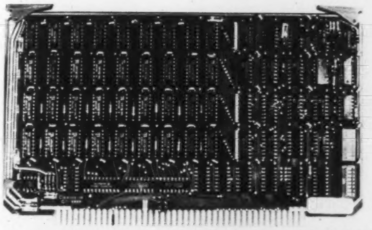

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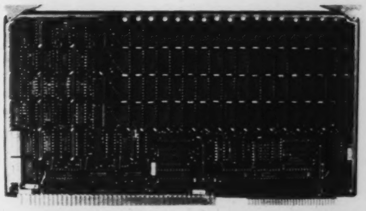

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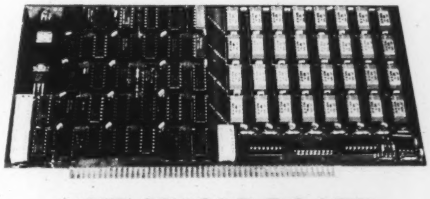

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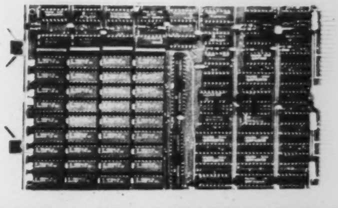

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mation and style of play. Although the story line is a bit weak, *Escape from Rungistan* features some very novel problem solutions.

Copts and Robbers from Sirius is a good graphics-only adventure for the very young.

Keyboard Control

Another type of adventure requires that the movement of the character be controlled from the keyboard. These are challenging and require a somewhat different approach than the games that move the character about in response to verbal commands.

Their common drawback in the classroom is that they don't lend themselves to group play. Aside from this, they are very involving games. Examples include *Ultima, Odyssey, Adventure to Atlantis*, and *Temple of Apshai*.

The Search Series

In a category by itself is a set of simulations from McGraw-Hill called the Search Series. These are designed for use in the elementary and middle school classroom.

After having used *Geography Search* and *Community Search*, I have nothing but the highest regard for the quality of learning they encourage and their unique and innovative design.

Community Search, for example, is a simulation of man's early civilization building and confronts students with the kinds of decisions these people had to make. The class is divided into four groups of nations and told that they have been successful up to this point but are about to face a severe drought. Students progress by trial and error to knowledge of the best way to survive. *Geography Search* simulates the days of the early explorers at sea.

Scientific Simulations

The last group of games I will consider includes simulations that are based on actual scientific phenomena. Although I have seen quite a few of these, several are truly outstanding.

The first is *Rendezvous* from EduWare. In this simulation of the US Space Shuttle, the player flies the shuttle into space, establishes orbit, and then docks with a

Adventures In Education: A Comparison Chart

Program	TRS-80	Atari	Apple	IBM	Fantasy/Adventure Qualities	Historical/Scientific Qualities	Works for one person	Works for a group of people	Has character development	All text
Adventureland		✓	✓		✓		✓	✓		
Pirate Adventure		✓	✓		✓		✓	✓		
Curse of Crowley Manor		✓	✓				✓	✓		
Interactive Fiction (discontinued)					✓		✓			✓
Labyrinth of Crete			✓		✓		✓	✓		
Temple of Apshai	✓	✓	✓	✓	✓		✓		✓	
Dragon's Eye		✓	✓		✓		✓			
Hellfire Warrior	✓	✓	✓		✓		✓		✓	
Empire of the Overmind	✓	✓	✓		✓		✓	✓		✓

space station. Accomplishing the docking maneuver is difficult, but the player gets a good sense of what it must be like to pilot a space craft.

Another simulation by the same author is a trip to Saturn called *Saturn Navigator* from Sublogic.

Microbe from Synergistic Software is a scientific adventure that takes place inside the human body. The player pilots a miniature submarine through the body to correct a patient's medical problem. To complete the mission, the player must make use of several resources, including a library, a navigator, a technician, and a physician.

The designers of the program have carefully provided the ability to control the difficulty of the mission, so that the game can be equally challenging for a 12-year-old or a medical student. The documentation is good and offers an exciting introduction to the field of medicine.

Writing Your Own

Students and teachers who enjoy adventures often long to put their experience to use in an adventure of their own. Few, however, have the programming skills necessary to do so.

Genesis for the TRS-80 from Time Management Software of Cushing, OK, is a program that can make their wishes come true. The new adventure can be recorded on disk and offered as a challenge to other members of the class. The program includes a well written tutorial that enables the user eventually to create a game of whatever complexity he chooses. Prospective authors should, however, be experienced adventurers before they try to write games of their own.

Summary

Whether in the classroom or at home, adventures and simulations offer a high quality educational experience for young people. The problem solving techniques learned in a underground cave or on a space ship can be applied in many of the situations students will face in real life. Tackling these problems in a group can be particularly beneficial as students learn from each other, and I recommend adventures to any teacher who wants to add a new dimension to learning in his classroom. ☐

Hi-res and text	Quality of graphics[1]	Movement of characters by keyboard director	Level of difficulty[2]	Time required[3]	Student rating[4]	Hints available from company (mail or phone)	Complexity[5]	Suggested age	Price	Manufacturer Name, Address, Telephone Number
✓	4		3	3	3	✓	2	11+	$24.95	Adventure International P.O. Box 3435 Longwood, FL 32750 (305) 862-6917
✓	4		2	3	4	✓	2	11+	Cassette: $24.95 Disk: $39.95	Adventure International
✓	4		3	3	3	✓	2	11+	$24.95	Adventure International
	NA		1	1	2		1	11+	Cassette: $30.00 Disk: $39.95	Adventure International
✓	1		3	3	1		3	12+	$29.95	Adventure International
✓	2		3	3	2		5	10+	$39.95	Automated Simulations 1043 Kiel Ct. Sunnyvale, CA 94089
✓	3		2	2	2		2	10-12	$29.95	Automated Simulations
✓	3	✓	4	4	2		5	11+	$39.95	Automated Simulations
	NA		4	4	1	✓	3	12+	Cassette: $30.00 Disk: $35.00	Avalon Hill Game Co. 4517 Harford Rd. Baltimore, MD 21214

[1] 5 = Best graphics [2] 5 = Most difficult [3] 5 = Longest to play [4] 5 = Highest rating [5] 5 = Most complex

Adventures, continued...

Program	TRS-80	Atari	Apple	IBM	Fantasy/Adventure Qualities	Historical/Scientific Qualities	Works for one person	Works for a group of people	Has character development	All text
Ultima			✓		✓		✓		✓	
Sword Thrust (6 scenarios)			✓		✓		✓	✓	✓	✓
Volcanoes			✓			✓	✓	✓		
Rendezvous			✓			✓	✓	✓		
Creature Venture			✓		✓		✓	✓		
Mummy's Curse			✓		✓		✓	✓		
Starcross	✓	✓	✓	✓	✓	✓	✓	✓		
Deadline	✓	✓	✓	✓	✓		✓	✓		✓
Zork I, II, III	✓	✓	✓	✓	✓		✓	✓		✓
Community Search, Geography Search	✓		✓			✓		✓		✓
Snooper Troopers		✓	✓	✓	✓		✓	✓		
Mission Asteroid		✓	✓		✓		✓	✓		
Mystery House			✓		✓		✓	✓		
Wizard and the Princess		✓	✓		✓		✓	✓		
Crantson Manor			✓		✓		✓	✓		
Ulysses and the Golden Fleece		✓	✓	✓	✓		✓	✓		

Hi-res and text	Quality of graphics[1]	Movement of characters by keyboard director	Level of difficulty[2]	Time required[3]	Student rating[4]	Hints available from company (mail or phone)	Complexity[5]	Suggested age	Price	Manufacturer Name, Address, Telephone Number
✓	3	✓	4	4	3		3	12+	$39.95	California Pacific 1615 5th St. Davis, CA 95616
	NA		3	4	3		4	10+	$29.95 ea.	C.E. Software 801 73rd St. Des Moines, IA 50312
✓	3		5	5	5		5	15+	$50.00	Earthware P.O. Box 30039 Eugene, OR 97403
✓	4		5	4	5	✓	5	12+	$39.95	Eduware Services, Inc. P.O. Box 22222 Agoura, CA (213) 706-0661
✓	3		3	3	2	✓	2	11+	$29.95	Highlands Computer Services 14422 S.E. 132nd Renton, WA 98056
✓	3		3	3	2	✓	2	11+	$30.00	Highlands Computer Services
✓	3		5	4	4	✓	3	14+	$39.95	Infocom, Inc. 55 Wheeler St. Cambridge, MA 02138
	NA		5	4	4		5	13+	$49.95	Infocom
	NA		5	4	3		3	14+	$39.95	Infocom
	NA		3	3	5	✓	4	10-14	$180.00 ea.	McGraw-Hill 1221 Ave. of the Americas New York, NY 10020
✓	3		2	2	5	✓	3	10-13	$44.95	Spinnaker Software 215 1st St. Cambridge, MA 02142
✓	3		1	1	4	✓	1	10+	Apple: $19.95 Atari: $24.95	Sierra On-Line 36575 Mudge Ranch Rd. Coarsegold, CA 93614
✓	3		2	2	4	✓	1	10+	$24.95	Sierra On-Line
✓	3		3	3	5	✓	2	10+	$32.95	Sierra On-Line
✓	3		3	3	4	✓	2	11+	$34.95	Sierra On-Line
✓	4		4	3	5	✓	2	11+	Apple: $34.95 Atari: $39.95	Sierra On-Line

[1] 5 = Best graphics [2] 5 = Most difficult [3] 5 = Longest to play [4] 5 = Highest rating [5] 5 = Most complex

Adventures, continued...

Program	TRS-80	Atari	Apple	IBM	Fantasy/Adventure Qualities	Historical/Scientific Qualities	Works for one person	Works for a group of people	Has character development	All text
Time Zone			✓		✓	✓	✓	✓		
Transylvania			✓		✓		✓	✓		
Adventure in Time		✓	✓		✓	✓	✓	✓		✓
Birth of the Phoenix		✓	✓		✓		✓	✓		✓
Queen of Phobos			✓		✓		✓	✓		
Ali Baba & the Forty Thieves		✓	✓		✓		✓	✓	✓	
Copts and Robbers			✓		✓		✓			
Escape from Rungiston			✓		✓		✓	✓		
Wizardry			✓		✓		✓	✓	✓	
Knight of Diamonds (sequel to Wizardry)			✓		✓		✓	✓	✓	
Saturn Navigator			✓			✓	✓	✓		
Space Vikings			✓		✓		✓			
Microbe		✓	✓			✓	✓	✓		
Odyssey			✓		✓		✓		✓	
Apventure to Atlantis			✓		✓		✓		✓	
Mask of the Sun					✓		✓			

Hi-res and text	Quality of graphics[1]	Movement of characters by keyboard director	Level of difficulty[2]	Time required[3]	Student rating[4]	Hints available from company (mail or phone)	Complexity[5]	Suggested age	Price	Manufacturer Name, Address, Telephone Number
✓	4		5	5	5	✓	3	12+	$99.95	Sierra On-Line
✓	4		3	3	5	✓	3	10+	$19.95	Penquin Software 830 4th Ave. Geneva, IL 60134
	NA		3	3	3	✓	2	11+	$29.95	Phoenix Software, Inc. 64 Lake Zurich Dr. Lake Zurich, IL 60047
	NA		1	1	4	✓	1	10+	$22.00	Phoenix Software, Inc.
✓	4		3	3	3	✓	2	11+	$34.95	Phoenix Software, Inc.
✓	3	✓	4	3	3		4	11+	$32.95	Quality Software 6600 Reseda Blvd., Suite 105 Reseda, CA 91335
✓	2		1-2	1-2	3		1	10-11	$34.95	Sirius Software, Inc. 10364 Rockingham Dr. Sacramento, CA 95827
✓	3		4	4	2	✓	3	13+	$29.95	Sirius Software, Inc.
✓	3		4	5	5		5	11+	$49.95	Sir-Tech Software, Inc. 6 Main St. Ogdensburg, NY 13669
✓	3		4	4	5		5	11+	$34.95	Sir-Tech Software, Inc.
✓	4		5	4	5		5	12+	$34.95	Sublogic Communications 13 Edgebrook Dr. Champaign, IL 61820
✓	3		4	4	1		4	13+	$49.95	Sublogic Communications
✓	4		3-5	2-5	5	✓	2-5	11+	$44.95	Synergistic Software 830 N. Riverside Dr., Ste. 201 Renton, WA 98055
✓	2		4	4	2		3	11+	$29.95	Synergistic Software
✓	4		5	4	3		4	13+	$39.95	Synergistic Software
✓	4		4	4	2		3	13+	$39.95	Ultrasoft

[1] 5 = Best graphics
[2] 5 = Most difficult
[3] 5 = Longest to play
[4] 5 = Highest rating
[5] 5 = Most complex

creative computing software evaluation

The ABC's of TI Software

Sherrie Van Tyle

Many buyers of low-cost computers select the TI 99/4A because of Texas Instruments' reputation for superior educational software. Does the software help a child develop reading and arithmetic skills, or does it merely dress up ordinary drills in colorful graphics and charming music? Let's have a look.

Early Learning Fun

Early Learning Fun from Texas Instruments offers drills in numbers, shapes, sorting, and the alphabet for children ages three to six.

The child will need a parent's help to follow the on-screen instructions and to become familiar with the computer keyboard. During the drills, the child matches the letter or number on the screen with the letter or number on the keyboard. The spacebar is used only to repeat a drill; the zero key tells the computer to go on to the next drill.

The exercises are arranged from the easiest—number and shape recognition—to more difficult drills in sorting and the alphabet. The drills are arranged to reinforce one another. For example, in the first set, a number appears on-screen for the child to match; the second set reverses the drill, asking the child to pick a number, which then appears on screen.

creative computing

SOFTWARE PROFILE

Name: Early Learning Fun

Type: Educational

System: TI 99/4A

Format/Language: Cartridge/machine

Performance: Very good

Ease of Use: Good

Documentation: Good

Price: $29.95

Summary: Number and alphabet recognition, sorting and counting drills for preschoolers.

Overall Mark: Good

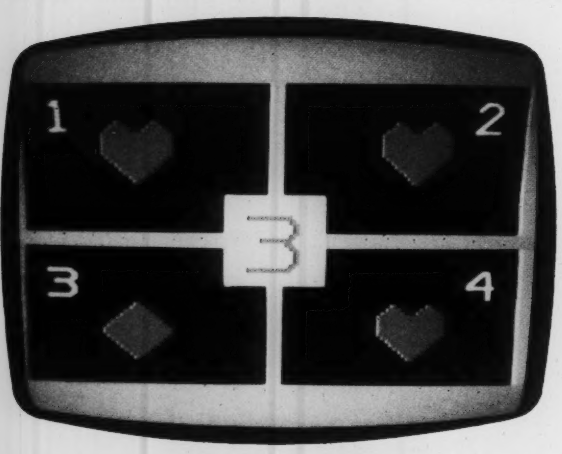
Manufacturer:
Texas Instruments
P.O. Box 53
Lubbock, TX 79408
(800) 858-4565

If the child presses the correct number, a series of musical notes chimes, and a matching number of brightly colored shapes appears. If the child's response is wrong, a deep tone sounds, and the child must try again until he finds the correct number. No score is kept.

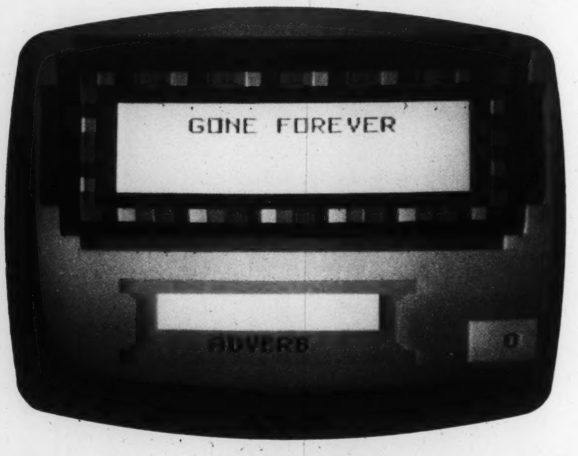
According to the instructions, during the number drill the child "learns that the numeric symbol . . . represents a concrete quantity of things," The shapes that accompany the numbers are two-dimensional. Although a child may recognize the shape of the number 2, he may need tangible examples to understand the idea of two. You could, for example, group a set of blocks near the computer in increments up to 10 and have the child pick up the appropriate number of blocks.

The sorting drill sharpens cognitive skills. The child, presented with four shapes, must pick out the one that is unlike the rest and press the number next to that shape. This is more difficult than matching shapes and takes time to master.

During the alphabet drill, you may want to help the child think of other words that



Early Learning Fun



Beginning Grammar

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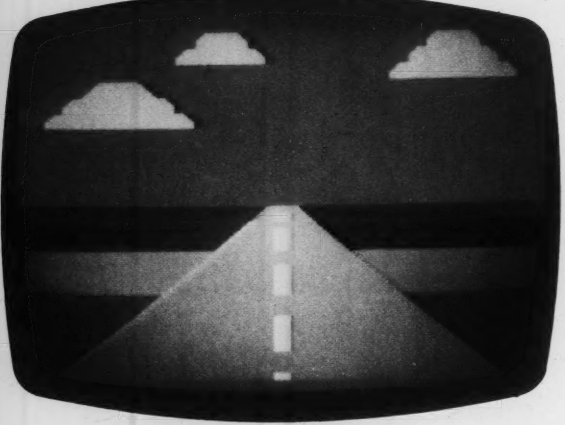
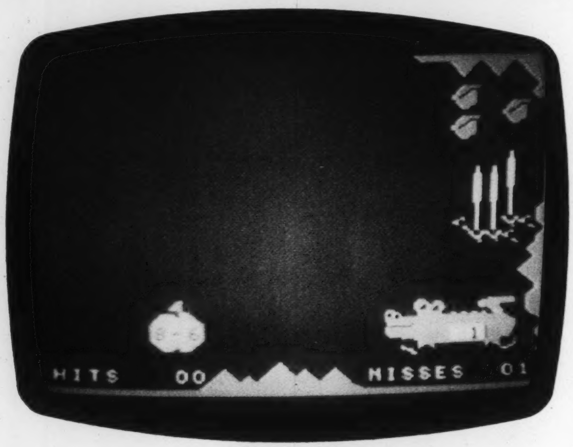


Addition and Subtraction 2



Alligator Mix

begin with the same letter. Vowels, of course, have several different sounds each. Phonic flash cards could be used to supplement the alphabet drill.

Early Learning Fun delivers the fun it promises. On his own, a child enjoys the music and graphics and becomes acquainted with the computer. If the parent and child play together, with the addition of concrete examples and phonic practice, the software becomes educational.

Beginning Grammar

Beginning Grammar from Texas Instruments introduces the parts of speech to children in grades two to five. Children must be familiar with the computer keyboard because the drills use a combination of the spacebar, numbers, and letters.

Seven of the eight parts of speech are defined and presented in the drills (interjections are omitted). The prepositions and conjunctions, however, are combined in one drill; this confuses a child. The definition of a pronoun as a word that "relates a noun or pronoun to another word in the sentence" is too vague, especially when a conjunction is defined as a word that "joins words or groups of words together."

The definitions of nouns, verbs, pronouns, and adverbs are straightforward. A child learns shortcuts quickly—many adverbs end in *ly* and conjunctions are easily memorized in a rhyme, "and, or, but, nor." A parent or teacher can give specific examples of how prepositional phrases work in a sentence or act them out for the child: in a box, out the door, and under the chair.

Graphics are used cleverly: adjectives are displayed on a restaurant menu; adverbs on a theater marquee. Verbs are lifted off the screen. For nouns, the child moves the word selected by the computer into one of four slots: person, place, thing, or not a noun.

creative computing

SOFTWARE PROFILE

Name: Beginning Grammar

Type: Educational

System: TI 99/4A

Format/Language: Cartridge/machine

Performance: Good

Ease of Use: Fair

Documentation: Fair

Price: $29.95

Summary: Clever graphics introduces the parts of speech.

Overall Mark: Good

Manufacturer:
Texas Instruments
P.O. Box 53
Lubbock, TX 79408
(800) 858-4565

As in *Early Learning Fun*, the computer responds to a wrong answer with a low sound; for a correct answer, a short tune plays. Scoring is understated; a correct answer is worth one point, and the score is totaled in a small box at the lower right of the screen.

If the child hesitates for more than 30 seconds, the computer flashes a help screen that asks if he wants to see the instructions, redo the drill, or continue. Most children learn quickly where the AID key is. When the child is searching for the keys to type a word, the help screen merely interrupts and irritates.

Few elementary students are skilled touch typists, but in *Beginning Grammar*, the child must shift between the spacebar, letters, and numbers to enter answers. Presumably, the spacebar could have been used throughout the program. If the child types a wrong letter, however, the low tone sounds and the space for the letter remains blank. After two wrong answers, the computer points out the correct response.

Beginning Grammar is a more entertaining way to learn the parts of speech than to diagram sentences. If the parent or teacher considers it an introduction and provides further explanation, especially of the exceptions to the rules, the drills are worthwhile. Despite its shortcomings, children enjoy working with the parts of speech in *Beginning Grammar*.

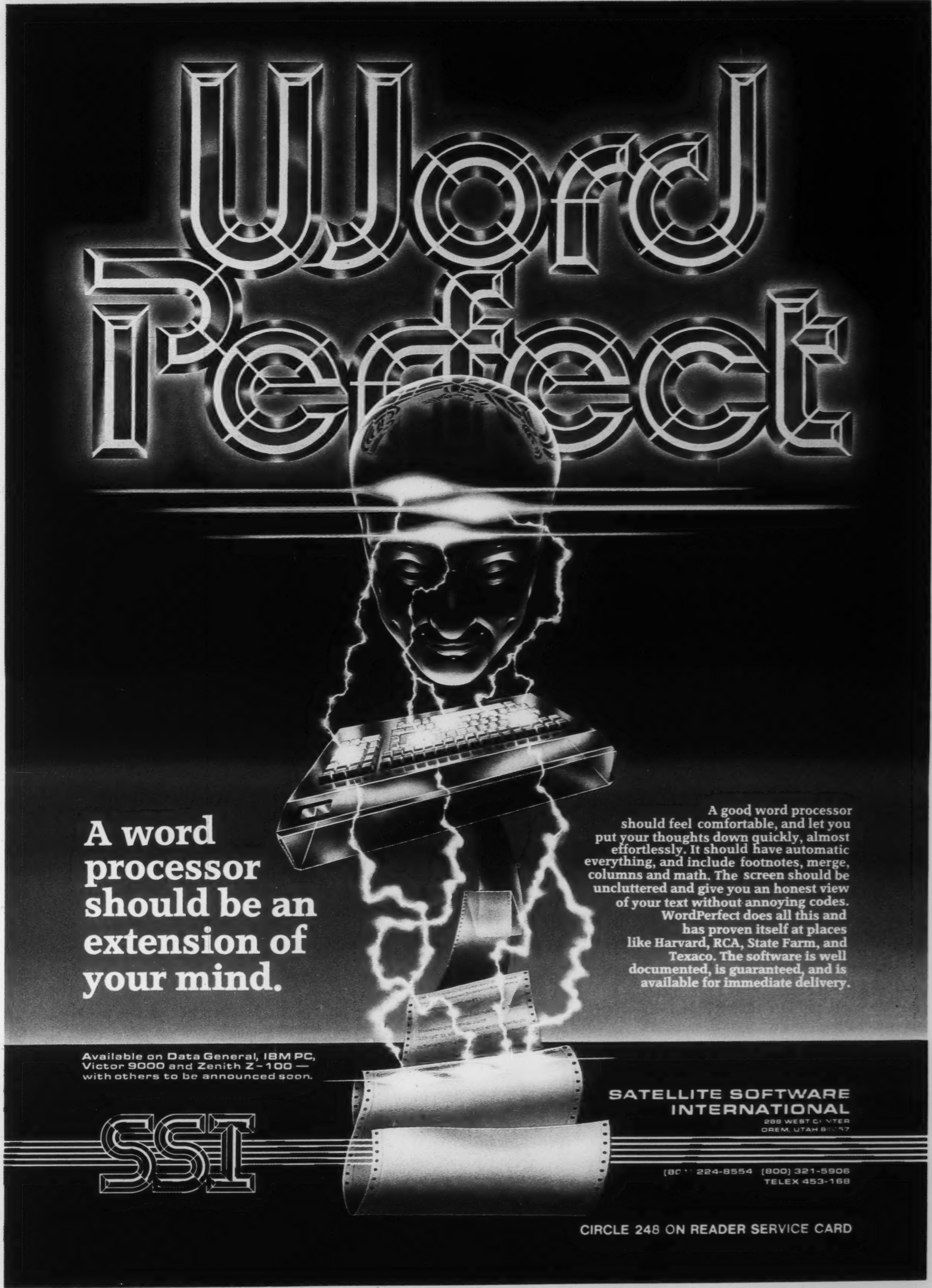
Addition and Subtraction 2

Addition and Subtraction 2 from Texas Instruments was developed by Scott, Foresman and Company. The drills, for elementary students, are arranged in nine sets, starting with a review of numbers 0 to 18.

The drills are structured carefully; addition of numbers horizontally is followed by addition vertically; then three numbers are added horizontally. To go on to the next set, the child must answer 80% of the problems correctly.

Each drill starts with a tutorial. Along with the problem, the appropriate number of colored bars and objects are displayed on screen. When the numerals are added in the problem, the bars and the objects combine too. For young children, the concrete examples are important for them to understand what addition and subtraction mean, and the child may ask for another example. With larger numbers, the screen grows too crowded, however. The bars are small and difficult to count.

To enter an answer, the child presses the number keys. If the answer is wrong,



A word processor should be an extension of your mind.

A good word processor should feel comfortable, and let you put your thoughts down quickly, almost effortlessly. It should have automatic everything, and include footnotes, merge, columns and math. The screen should be uncluttered and give you an honest view of your text without annoying codes. WordPerfect does all this and has proven itself at places like Harvard, RCA, State Farm, and Texaco. The software is well documented, is guaranteed, and is available for immediate delivery.

Available on Data General, IBM PC, Victor 9000 and Zenith Z-100 — with others to be announced soon.

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the computer places a red x over the answer. The message "try again" appears. If the child answers incorrectly a second time, the computer provides the right number.

The rewards for correct answers are ingenious graphics: an airplane tows a "way to go" sign across the top of the screen, a train chugs along the bottom, and a car inches ahead on a two-lane highway. A short tune accompanies the graphics.

creative computing

SOFTWARE PROFILE

Name: Addition and Subtraction 2

Type: Educational

System: TI 99/4A, speech synthesizer optional

Format/Language: Cartridge/Machine

Performance: Good

Ease of Use: Very good

Documentation: Good

Price: $39.95

Summary: Comprehensive drills in addition and subtraction of numbers up to 18.

Overall Mark: Very good

Manufacturer:
Texas Instruments
P.O. Box 53
Lubbock, TX 79408
(800) 858-4565

Level nine is a review of the addition and subtraction skills the child has learned. If the child answers at least 20 of the 24 problems correctly, he goes on to Extra for Experts, which approaches elementary algebra in skill.

In sum, *Addition and Subtraction 2* is well designed to sharpen arithmetic skills in young children. If the child works his way through the nine sets, he will have mastered elementary addition and subtraction.

Alligator Mix

Alligator Mix from Texas Instruments was developed by Jerry Chaffin and Bill Maxwell of the University of Kansas. *Alligator Mix* is an arcade-style drill in addition and subtraction for children ages 5 to 12.

The game is set in a swamp populated by alligators and apples. The object is to solve the addition or subtraction problem that appears in the apple, matching it with the solution that appears on the alligator's body. If the answer matches, the child opens the alligator's mouth by pressing the spacebar or the fire button on the joystick. If the answer on the alligator is wrong, the child does nothing; the apple disappears. The child scores points either way.

If three problems are solved correctly, the eyes of the alligator surface; for four correct answers, the head appears; for five right, another alligator pokes his head up. Each time, the alligators appear closer to the center of the screen, shortening the time available to solve the problem in the apple. A total of five alligators may be in the swamp at one time.

If the child lets the alligator eat an apple that does not match the solution or if he fails to open the animal's mouth for a correct solution, a miss is tallied at the bottom of the screen.

When the child misses too often, the alligators do not surface as quickly. Three missed problems in a set and the child must start a new set of problems on the alligator one level below. When three alligators vanish, the game ends, and the scoreboard appears.

The game is preset for skill level seven, which is too advanced for most young children, for problems using numbers 0 to 9, and for two minutes of play. After the title screen, the skill level can be set from one to nine by pressing AID. At level one, the child has about seven seconds to solve the problem before the apple reaches the alligator. If the child wants to use joysticks, this choice must be entered on the options screen. The game plays better with the joysticks. For young children, limiting the range of problems to numbers 0 to 3 makes it less frustrating.

Adults enjoy *Alligator Mix* because of its arcade-style play. The instructions say the child learns essential mathematical principles while he plays. To enjoy the game, however, he must understand the concepts of addition and subtraction. The game makes repetitious drills fun, but the child is merely practicing skills he already has. Of the four TI software packages reviewed here, only *Alligator Mix* misses the educational mark. ☐

creative computing

SOFTWARE PROFILE

Name: Alligator Mix

Authors: Jerry Chaffin and Bill Maxwell

Type: Educational

System: TI 99/4A, joysticks recommended

Format/Language: Cartridge/machine

Performance: Good

Ease of Use: Fair

Documentation: Adequate

Price: $39.95

Summary: Arcade-style addition and subtrtaction drills. More game than education. Also programmed in five foreign languages.

Overall Mark: Fair

Manufacturer:
Texas Instruments
P.O. Box 53
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The directions, illustrations, exercises, and user-input all appear on the display screen. As you practice, the program leads the way. An illustration of the keyboard remains on the screen for the first exercises. You can refer to the illustration on the display screen instead of looking at the keyboard. How handy!

When you make a mistake, 2 things happen:

1. The keyboard locks up until you strike the right key.

2. The correct key flashes on the illustrated keyboard on the screen until you find it and can continue with the exercise.

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Joust Comes Home

Owen Linzmayer

I've always loved arcade games in which two people can play simultaneously. Rather than simply competing against computer-driven opponents, you must contend with yet another variable: the other player. Arcade owners enjoy the larger profits that two-player games invariably generate. Some of my past favorites have been Rip-Off, Eliminator, and Space War.

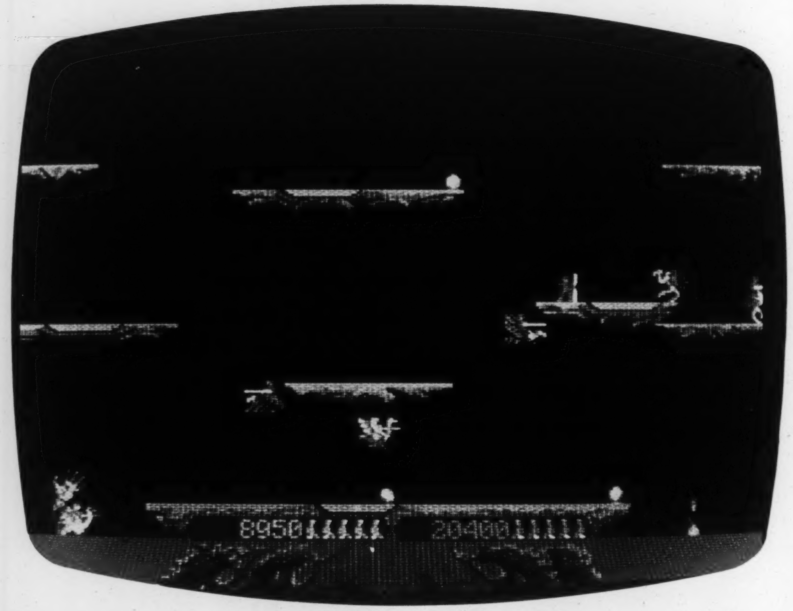
In recent months, two-player games have become much more sophisticated and complex. William's Joust, one of the most popular of this new breed, has finally reached the home front in the form of *Lancer* for the TRS-80 Color Computer and *Clash* for the Model I/III.

Joust

Manufactured under the Williams name, Joust has proven to be one of the most popular arcade titles of 1983. It continues to rank high on the earnings chart published by *Play Meter* magazine, the coin-op industry bible.

In Joust, you are represented by a knight riding upon a mythological flying bird. Using a bi-directional joystick and a "flap" button, you must fly around the screen and unseat enemy riders. To knock a knight off his mount successfully, the lance that you wield must be higher than his when your two birds make contact.

When you play with a human opponent, you are confronted with more complex and intriguing waves of enemies and you must make additional strategy decisions. Most important, you must decide whether to compete or cooperate.

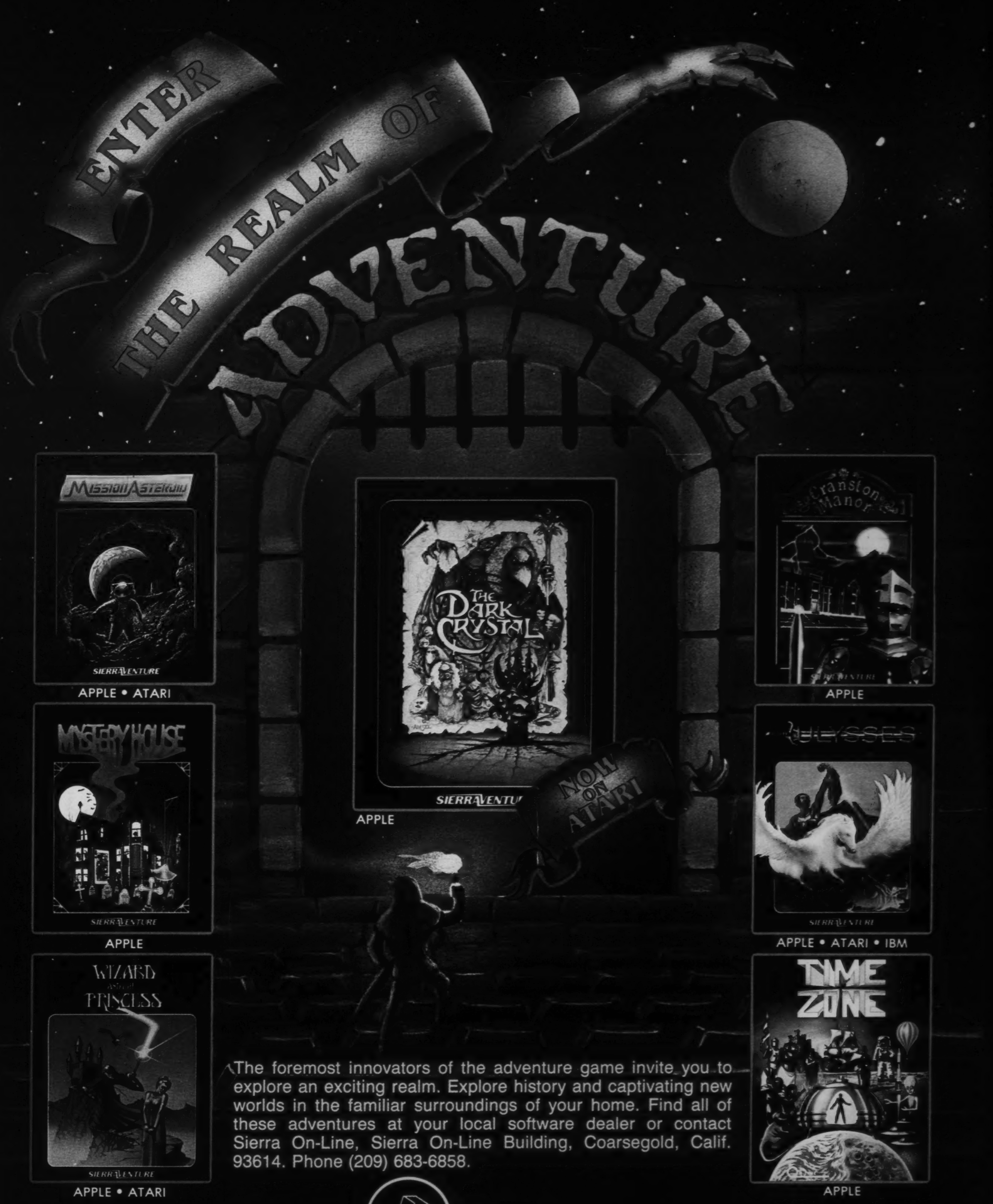


The real thing: Joust in the arcades.

Lancer

With an enviable reputation for producing quality coin-op adaptations, Spectral Associates has recently introduced *Lancer* by Rick LaMont. Designed for use on a 32K TRS-80 Color Computer, *Lancer* does such a good job of emulating Joust that I find it difficult to believe that I don't have to drop in a quarter after every play.

After you load the copy-protected program, the entire screen turns either blue or red. You press the reset button on the back of the Color Computer until the screen is red to ensure that the colors are correct during game play. The program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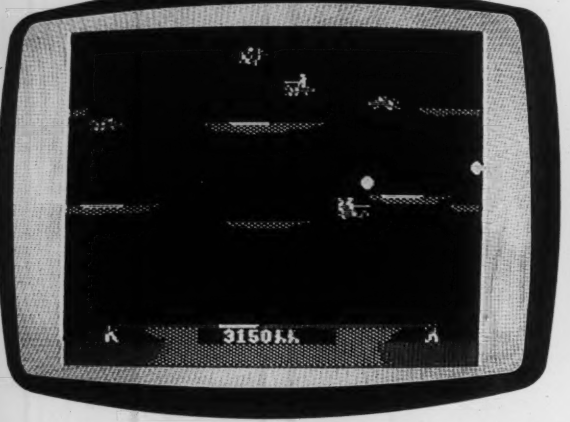
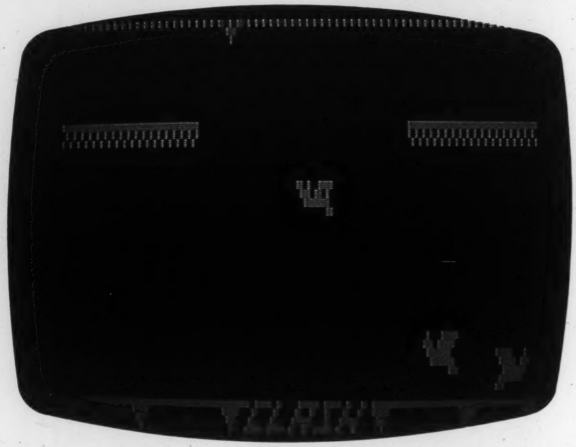
CIRCLE 227 ON READER SERVICE CARD



Lancer. A one-person game in progress. Player is at the top of the screen, about to collide with an enemy rider.



Clash. Bat wave in process. The player is in the middle of the screen. Note the spike forming on the ceiling.

then asks you how many people will play, their names, and the difficulty level (0-15) at which they want to play.

The game screen looks very much like that of Joust (see photos). All of the ledges and portals are located in the same positions, and the score is displayed at the bottom. Your mount sparkles as if materializing whenever it enters the playfield. If after five seconds you do not press a control, it solidifies, and your state of immunity is over. *Lancer* plays best with Atari switch-type controllers rather than the Tandy potentiometer joysticks.

The enemy riders are silver and ride on blue buzzards. Since both of the players' knights are red and aren't distinguishable, you must carefully keep track of your own position on the screen to avoid confusion and conflict. The hi-res graphics are top-notch—right up there with DataSoft's *Zaxxon* and Intracolor's *Robottack*. There is a myriad of colors in the painstakingly detailed graphic characters. The components in *Lancer* mimic the actions of those found in Joust almost to a tee; the wings flap, the eggs bounce, and the necks of the birds bob back and forth as they fly across the screen.

The game is broken into waves, each with its own special objective. On the energy waves, you must race around the screen and pick up all the eggs before they hatch. Team waves require you to cooperate with your partner if you wish to collect a bonus. On the eighth wave you must avoid the deadly "invincible" dragon. Every wave in Joust has an equivalent in *Lancer*—you don't miss out on a thing.

The best word to describe the sound effects of *Lancer* is spartan. Luckily, the exciting game play and excellent graphics make up for the lack of first-rate audio effects. The one other thing I find fault with is the sluggishness of the controls. *Lancer* doesn't give you that perfectly smooth, fluid movement found in other games. Part of the problem probably lies with the slow 6809 microprocessor inside the Color Computer, but I am convinced that the game could function quicker and more efficiently. At times it feels as if you are playing in an atmosphere with high gravity. With practice, though, you can perform graceful landings and aerobatics just as you do in Joust.

Lancer stands among the top Color Computer games of the year. If Oscars were awarded to computer programs, I would nominate *Lancer* without a second thought. I recommend that you go out and play a game of Joust. If you like it, purchase a copy of *Lancer*. You won't be disappointed.

creative computing

SOFTWARE PROFILE

Name: Lancer

Author: Rick LaMont

Type: Arcade

System: 32K TRS-80 Color Computer; joysticks

Format: Tape/disk

Language: Assembly

Summary: Joust in its finist form.

Price: $21.95/$24.95

Manufacturer:
Spectral Associates
141 Harvard Ave.
Tacoma, WA 98466

Clash

Just because the TRS-80 Models I and III produce only lo-res, monochrome graphics doesn't mean that software houses can't create great game programs for these systems. And don't be misled into believing that TRS-80 games are less fun to play than their Color Computer counterparts. *Clash*, another Joust adaptation, attests to this.

Written by Bill Dunlevy, *Clash* borrows heavily from Joust, but does not attempt to pass itself off as a clone of the coin-op game. The basic concept is the same: you ride upon a flying bird and must defeat enemy creatures by colliding with them. But *Clash* turns some very interesting twists that make it different from any other game available. Instead of always going head-to-head against a human opponent, you must also combat eerie creatures such as cave spiders and bats. And don't forget to be on the lookout for spikes that drop from the cavern ceilings when you least expect it.

Before the action begins, you select the difficulty level you wish (1-4). Each level consists of five separate waves, and by choosing a higher starting level you can

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SOFTWARE PROFILE

Name: Clash

Author: Bill Dunlevy

Type: Arcade

System: 16K TRS-80 Model I/III

Format: Tape/disk

Language: Assembly

Summary: Worth every penny.

Price: $21.95/$24.95

Manufacturer:
Computer Shack
1691 Eason
Pontiac, MI 48054
(313) 673-2224

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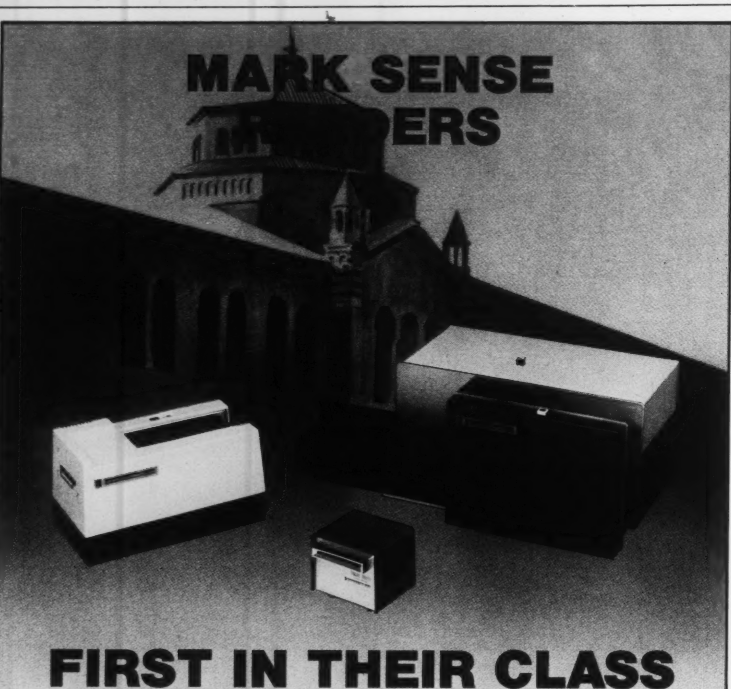

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Joust, continued...

skip the easier rounds. During each wave you are challenged in a different way. Sometimes you must simply unseat enemy riders, while at other times you must scoop up valuable gems (eggs) before they turn into dangerous spiders.

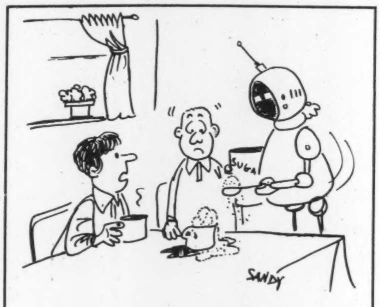
When compared to other arcade games for the TRS-80, *Clash* looks very good. The excellent animation of the characters is what sets it apart from the rest of the pack. The sound effects are also commendable. If you have the disk version of *Clash* and you connect the AUX jack to an amp/speaker, you are treated to voice effects in addition to the audio. The speech is very crisp and recognizable.

The game plays very well. The players' mounts move rapidly and seem to be quite responsive to either form of control. Whereas *Lancer* has a slow moving feel to it, *Clash* bustles along at a rapid pace. Even when there is a large number of objects on the screen simultaneously, everything flows smoothly, and the animation rarely appears to flicker.

Clash has both one- and two-player modes and can be played with either a joystick or the keyboard. Unlike many other games that cramp both players at the keyboard, the key controls in *Clash* are spaced well for two people. The keyboard is also used to advance the menu, select number of players, pause/continue the game, enter high scores, and choose a starting difficulty level.

Both the cassette and disk versions have daily and all-time high score charts. If you qualify for either, you can input up to 19 characters to accompany your score. The all-time high scores are saved immediately to disk as a permanent record. Users of cassette versions can save and load scores using a tape recorder.

TRS-80 owners need not sulk as long as exciting arcade games such as *Clash* are on the market. While not as visually appealing as *Lancer*, *Clash* incorporates all of the qualities of the coin-op game into a neat package that costs less than $25. Heck, that's only half as much as I pump into Joust in a week. ☐



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Apple*, Commodore*, Timex/Sinclair* . . .

by William B. Sanders

The idea of getting your own computer sounded wonderful. But now that you have it you're a little scared . . . you think it sounds so technical. Well, take heart. Relax. Help is here. William B. Sanders has written individual books about the Apple, the Commodore 64, and the Timex/Sinclair computers. When you select the one which matches your computer you can breathe easy because it'll be like having your all-time favorite teacher at your side . . . gently guiding you, explaining, and showing.

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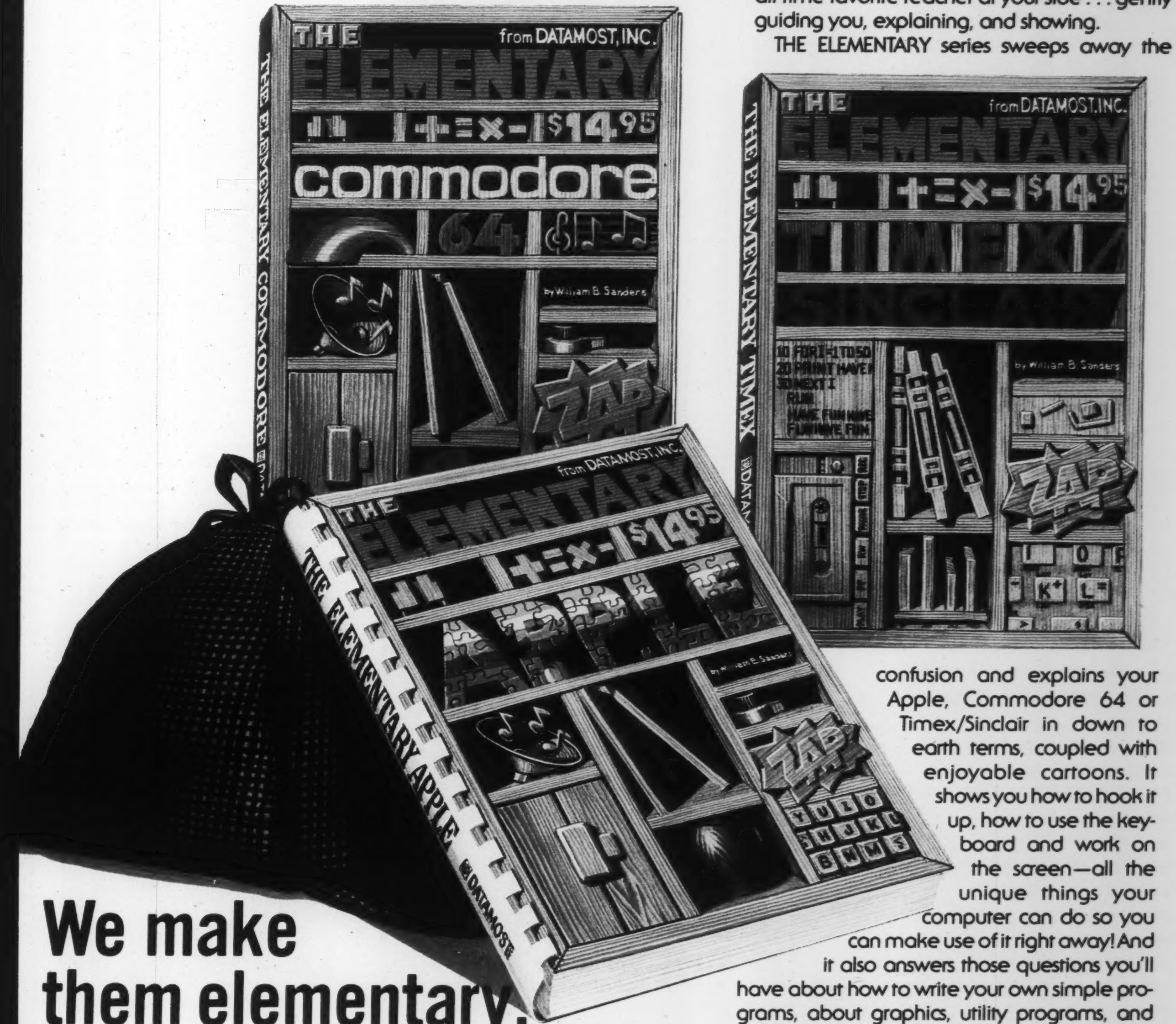
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EduTech CompTrol Lab

Computer-Aided Physics Experiments

David H. Ahl

The CompTrol Lab is a software and hardware system for running computer-controlled physics experiments. The hardware is manufactured by Pasco Scientific and consists of an infrared photogate and an interface box.

The photogate is shaped like a large C, 4 ½" high. In one tip is an infrared light source and in the other, a detector. A base and 10" post hold the detector in an upright or inverted position.

The photogate plugs into a Pasco general-purpose interface which, in turn, plugs into the game port of the Apple computer. All power to the system comes from the Apple. Two transducers, such as photogates, thermistor probes, etc. can be connected simultaneously to the interface. (A third program in this series uses a temperature probe; we did not test it.)

creative computing

SOFTWARE PROFILE

Name: CompTrol Lab (Pendulum and Acceleration)
Type: Computer-run lab experiments
Author: John Elberfeld
System: 48K Apple
Format: Disk
Summary: Computer helps perform experiments.
Price: $325 (components are available separately)
Manufacturer:
EduTech, Inc.
634 Commonwealth Ave.
Newton Center, MA 02159
(617) 965-4813

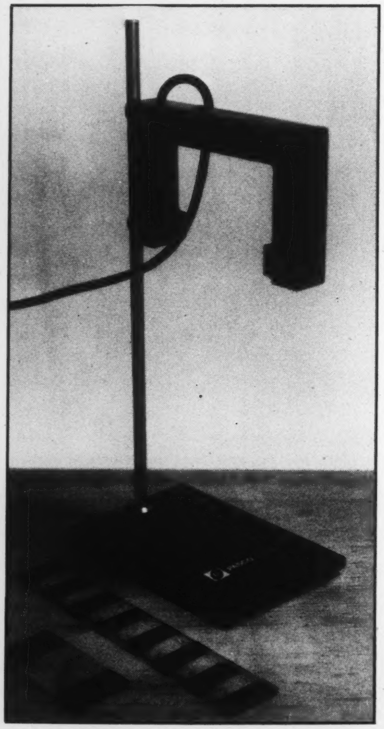

Figure 1. Photogate (infrared light source and detector) and rules used in acceleration experiments.

Each set of experiments has a disk, instruction manual, and student manual (20 pages). The 14-page instruction manual describes the experimental apparatus for both the Pendulum and Acceleration experiments. It provides schematic diagrams of the circuits, set-up directions, and test programs to check out the apparatus. We found that everything was in order and quickly skipped to page 8 which describes the two experiments.

Pendulum

The first half of the Pendulum student manual is a theoretical discussion of pendulums. It contains the formulae relating period and amplitude as well as a discussion of the least squares method of fitting experimentally measured data points. It then describes the experiments and computer program. We had a bit of a problem setting up the experimental apparatus; the manuals have illustrations of the photogate, and a stylized drawing of a pendulum and detector, but there is no illustration of the entire apparatus.

Nevertheless, we fashioned a make-shift pendulum and started making measurements. With the aid of the computer, this is simplicity itself. There are

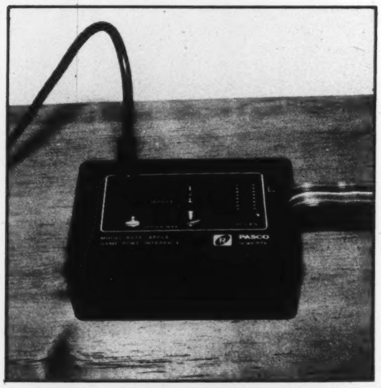

Figure 2. Pasco game port interface connects between Apple computer and experimental transducers.

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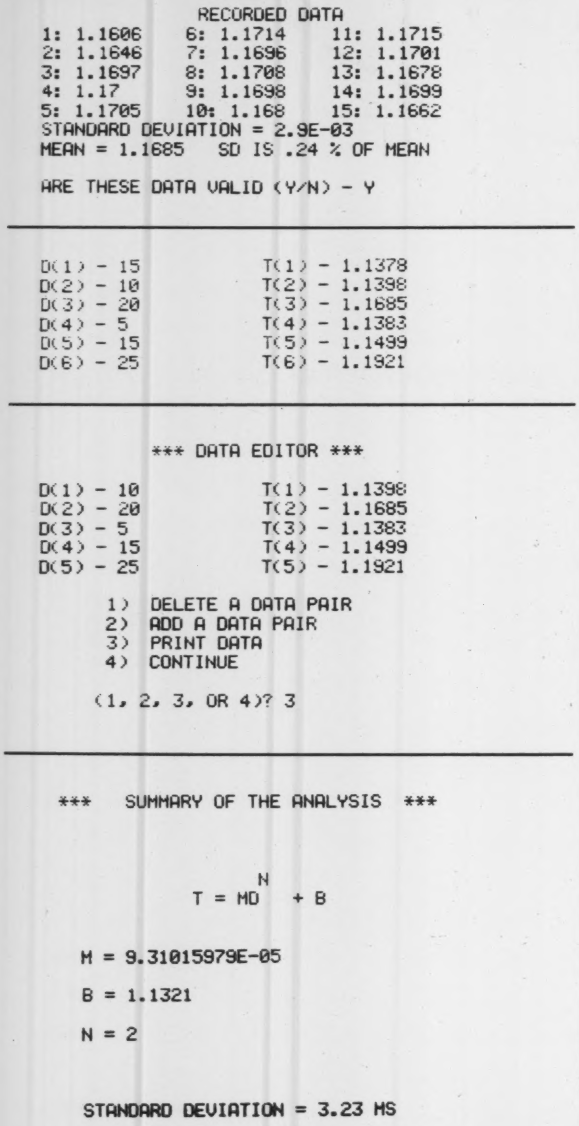


```
                 RECORDED DATA
1: 1.1606      6: 1.1714      11: 1.1715
2: 1.1646      7: 1.1696      12: 1.1701
3: 1.1697      8: 1.1708      13: 1.1678
4: 1.17        9: 1.1698      14: 1.1699
5: 1.1705     10: 1.168       15: 1.1662
STANDARD DEVIATION = 2.9E-03
MEAN = 1.1685    SD IS .24 % OF MEAN

ARE THESE DATA VALID (Y/N) - Y
```

```
D(1) - 15                  T(1) - 1.1378
D(2) - 10                  T(2) - 1.1398
D(3) - 20                  T(3) - 1.1685
D(4) - 5                   T(4) - 1.1383
D(5) - 15                  T(5) - 1.1499
D(6) - 25                  T(6) - 1.1921
```

```
               *** DATA EDITOR ***

D(1) - 10                  T(1) - 1.1398
D(2) - 20                  T(2) - 1.1685
D(3) - 5                   T(3) - 1.1383
D(4) - 15                  T(4) - 1.1499
D(5) - 25                  T(5) - 1.1921

       1)  DELETE A DATA PAIR
       2)  ADD A DATA PAIR
       3)  PRINT DATA
       4)  CONTINUE

      (1, 2, 3, OR 4)? 3
```

```
 ***   SUMMARY OF THE ANALYSIS   ***


                     N
             T = MD    + B


   M = 9.31015979E-05

   B = 1.1321

   N = 2


   STANDARD DEVIATION = 3.23 MS
```

Figure 3. Pendulum Experiment. Top chart shows one set of data points. Second shows means of six sets of data. Third shows data editor after deleting first set of points. Fourth screen shows the analysis. The graph would not print.

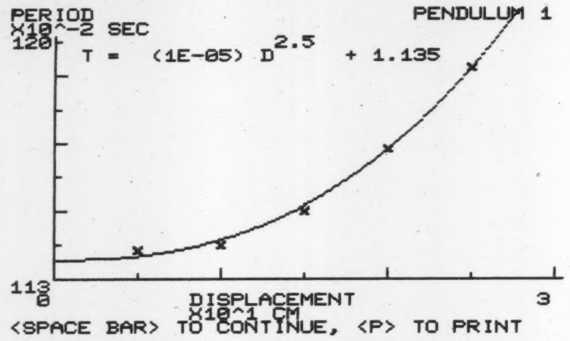
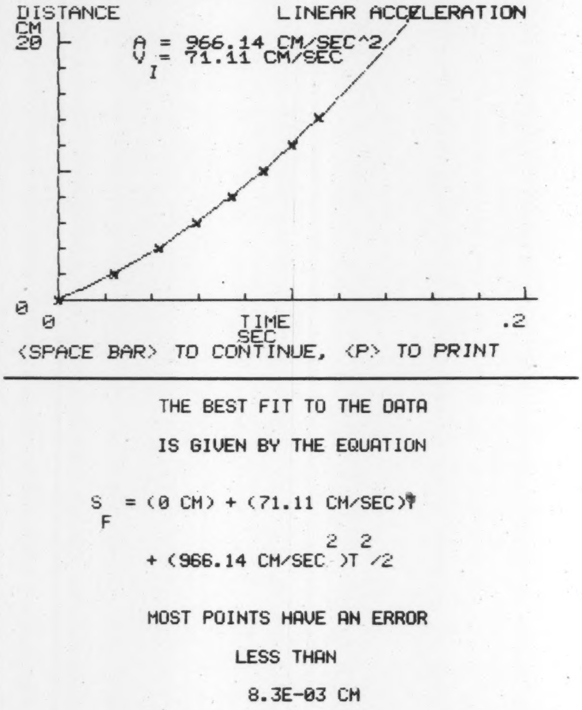


Figure 4. Pendulum output on computer-produced plot.



```
         THE BEST FIT TO THE DATA

         IS GIVEN BY THE EQUATION


     S  = (0 CM) + (71.11 CM/SEC)T
      F
                              2  2
        + (966.14 CM/SEC  )T  /2


         MOST POINTS HAVE AN ERROR

               LESS THAN

               8.3E-03 CM
```

Figure 5. Linear Acceleration Experiment. Graph shows good fit to experimental data, which is also indicated in the analysis below.

two experiments on the disk: Period and Amplitude, and Period and Length. For the first, you simply enter the horizontal displacement of the pendulum bob, enter the number of swings to be timed, and release the bob so it swings smoothly between the light and detector.

The computer measures the time between every other blocking of the light (one full period) for the number of swings you specified. It then displays the period of each swing, the average period, and standard deviation. It then asks if you are satisfied; if so, you can go on to the next measurement; if not, you can repeat a measurement.

If you botch it up completely, as we did on our first measurement, you can later go to the editing portion of the program and delete a set of data points. The procedure for doing this is not described in either manual; however, the menu-driven software is self-explanatory and easy to use.

When you have five or more sets of data, the computer will perform an analysis on the data for various values of n in the period/amplitude equation. The manual recommends trying all values of n from 0.5 to 3.0 in steps of 0.5 until you get the lowest standard deviation of the computed curve fitting your experimental points.

If you have a Silentype printer, the program will print out any of the screens as you progress through the experiment.

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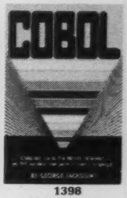

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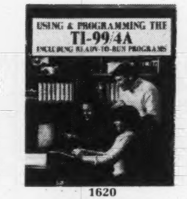
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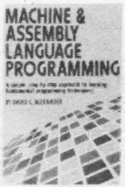
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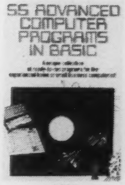
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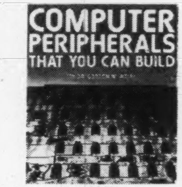
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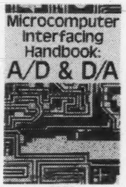
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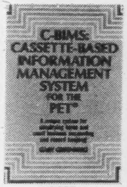
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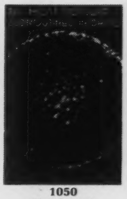

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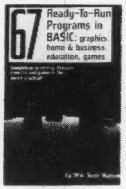
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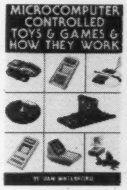
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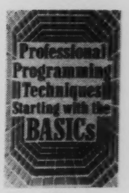
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CompTrol Lab, continued...

Any, except the graph, that is. (The graph screens on the Acceleration disk print out well; those on the Pendulum disk do not. Too bad; it is one that students will want.)

The Period and Length experiment is similar, but relates the length of the pendulum string to the period of oscillation. Also on the disk is a program to calibrate the apparatus with a 60 Hz light source such as a fluorescent lamp.

Four pages in the student manual are provided for recording the results of the experiments. Teachers will surely want to reproduce these for all students.

Acceleration

The Acceleraton disk contains two experiments: Linear Acceleration and Constant Acceleration. One analysis procedure is provided for Linear Acceleration, while three are provided for Constant Acceleration: Distance and Time, Velocity and Time, and Velocity and Distance.

In contrast to the Pendulum student manual, this one combines the theoretical discussion, formulae, and directions for doing the experiment. But like the Pendulum manual, this one suffers from a lack of one simple illustration showing the experimental apparatus with all the pieces in place.

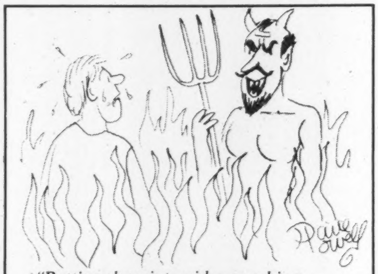
In the Linear Acceleration experiment, you drop a transparent ruler with strips of black tape on it through the photogate detector. The computer records and measures the time at which the leading edge of each strip breaks the light, plots the data points, and draws a best fit line between them.

Youngsters liked this experiment, although there wasn't really very much for them to do except drop the ruler and watch the computer do the analysis. They did find that dropping the ruler from a height of 50 cm or more resulted in its traveling so fast that the computer was unable to measure the acceleration.

The Constant Acceleration experiment required somewhat more participation and a great deal more coordination, as a plastic flag must be dropped (straight) from one hand and the spacebar pressed simultaneously with the other. As the manual warns, "this introduces a rather large random error in the experiment.... However, because the error is random its effect can be reduced by making repeated measurements at each height." Actually, this may be the right place for a discussion with students about accuracy. Compare the accuracy for the computer (seven figures) with the experimental measurements (two figures or less). Just because the final answer has five decimal places, is it really that accurate?

All in all, we found the CompTrol Lab a wonderful system for motivating some (but not all) students. We feel that it must be introduced in the proper perspective, i.e., "here is a valuable laboratory tool." It is not a replacement for precise experimental measurements, nor is it simply a way to avoid tedious calculation.

In addition to the two experiments marketed by EduTech, the apparatus will probably suggest numerous other possibilities. We think the CompTrol Lab is worth an investment of $325 for any school physics lab with access to an Apple. ☐



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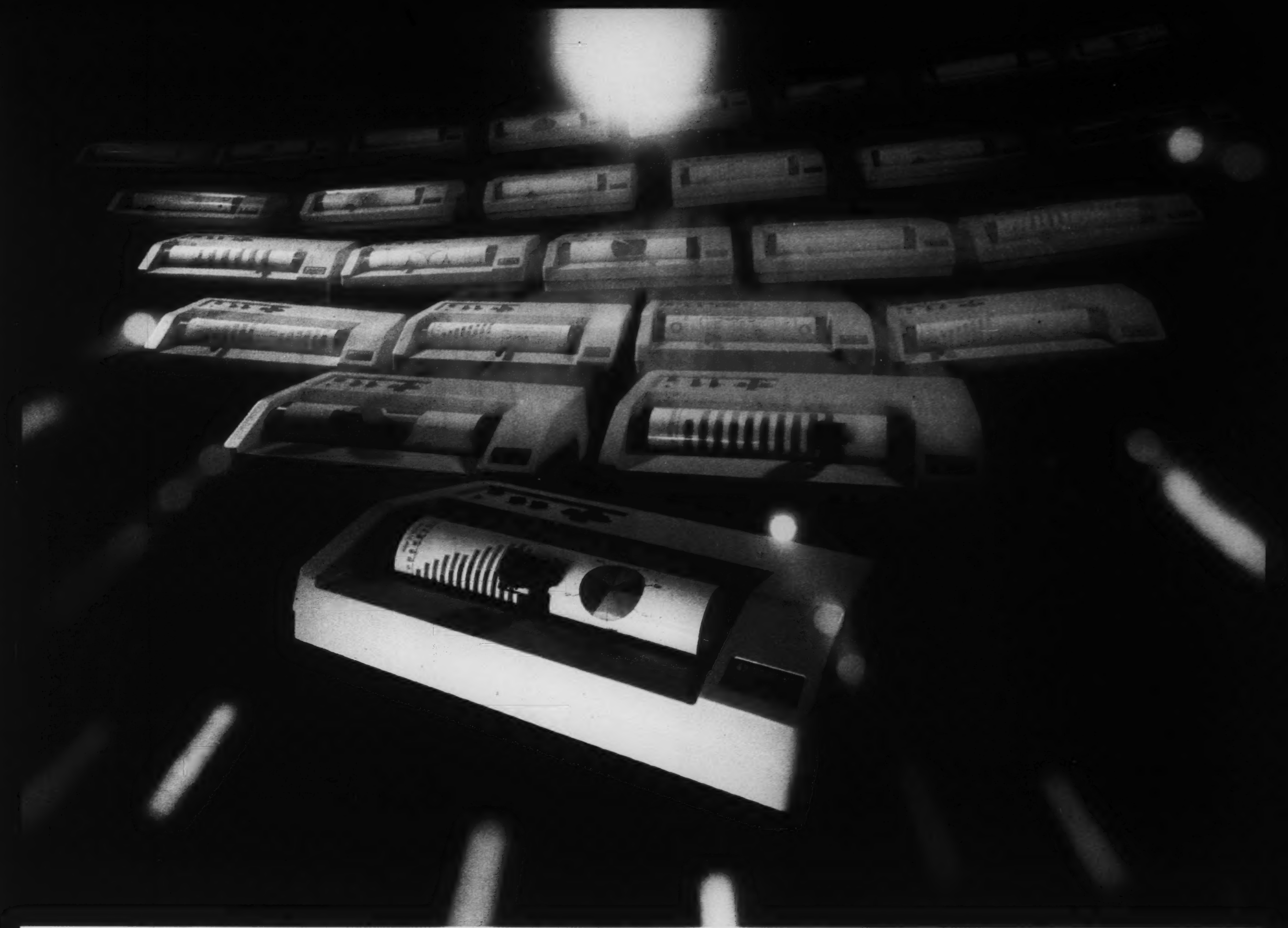

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9,250 APPLES FOR THE TEACHER

Ken Uston

In May, 1983, Apple Computer, Inc. announced a program called Kids Can't Wait (KCW). The primary objective of the program is to place an Apple IIe computer system in each of the roughly 9250 eligible elementary and secondary schools in California. (Schools with fewer than 100 students do not qualify for the program.)

Apple tried earlier, in vain, to originate a similar program on a national level. Apple's chairman, 28-year old Steve Jobs, ran into U.S. Congressman Fortney "Pete" Stark on an airplane flight. The two found themselves discussing student computer literacy and tax exemptions for companies donating computers to schools.

As a result of this encounter, Stark introduced a bill in 1982 in the House of Representatives providing for substantial tax credits for contributing companies. The bill allowed tax deductions based on fair market value, rather than cost, which could not exceed 200% of the cost to donors. Apple representatives calculate that, based on the maximum 46% federal corporate tax rate, the contributing companies would end up paying about 8% of the cost of donated equipment.

The bill passed the House overwhelmingly, but came to naught because it never reached the floor of the Senate during the unproductive lame duck session called by President Reagan in late 1982.

> ***Apple is offering a free Apple IIe system to every eligible elementary and secondary school in California.***

Because Apple pays substantial amounts of California corporate taxes, they simultaneously pursued the matter on a state level in Sacramento. This effort succeeded. On September 29, 1982, a bill sponsored by Assemblyman Charles Imbrecht passed in the California legislature. The bill provides that companies donating computer equipment to California public and private schools would get a 25% tax credit (that's credit, not deduction) from their California taxes based on the fair market value of donated equipment (that's fair market value, not cost). The law went into effect on January 1, 1983 and expires on June 30, 1984.

Apple launched their Kids Can't Wait program in January, 1983. Steve Jobs appointed a full-time KCW project director, Stephen Scheier, and set up an ad hoc team, which currently consists of four people. The team will operate until

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the KCW project has been completed, although one team member said, "If we go federal, I have no idea [how long the project team will continue]."

The Package

Apple is offering a free Apple IIe system to every eligible elementary and secondary school in California. The package includes a 64K Apple IIe computer, a display monitor, one floppy disk drive, and a copy of Apple Logo, a computer language designed for students. The current suggested retail value of the package is $2364. The KCW package also contains coupons for free and discounted educational software from more than 25 educational software publishers, including The Learning Company, Hayden Electronic Publishing, and Sterling Swift.

If all 9250 eligible California schools accept Apple's offer, the total retail value of the donated products will exceed $21 million. Apple projects that the gross cost of the program will be over $5.2 million. But here is where the tax credits make a significant difference.

It is estimated that the California tax credit will be $4 million. (This is less than 25% of $21 million because the net retail price is lower due to dealer discounts.) Thus the net cost of donating $21 million in product is about $1 million, a 95% reduction factor!

Apple is taking pains to ensure that the program runs as smoothly as possible. On May 11, 1983, they mailed an information kit explaining the KCW program to every school and school district in California. As of this writing, they have received positive responses from nearly all of the schools contacted.

Dealer Participation

Apple has contacted their roughly 170 dealers in California and offered them an incentive to conduct orientation sessions for school personnel. For every school session held, the dealer will receive an orientation certificate filled in by the school. Apple will give the dealer an Apple IIe for every 50 orientation certificates he obtains.

Eighty five percent of the dealers went along with the program. Participating dealers will set up an Apple IIe system on their premises (I imagine most have them set up already) on which school representatives may practice, and dealers will assist in explaining how to handle disks, how to operate the keyboard, and how to use Apple Logo. Apple is providing each dealer with two video tapes: one, designed for display to school personnel, explains the use of the Apple IIe; the second instructs dealers on the KCW program.

The motivation of the participating Apple dealers seems to be a combination of good business sense and an attempt to be good citizens of their communities. When asked why he was participating in the program, one large San Francisco dealer said, "Anything we can do to acquaint users with our equipment is bound to increase sales. There is no guarantee of any financial reward, but anyone with any sense can see it has got to be a positive factor."

A Marin County dealer said, "Sure, it'll take some of our time. But we're doing it basically to help the schools along. Many Marin schools now have computers, but a few of the poorer ones don't. Besides, the more educated people are about computers, the more they will come back to us."

An Apple dealer in Walnut Creek said, "We don't get any fee, but the 'door prize' figures out to about $2 per hour for the time we spent. But regardless, we don't mind doing it. It's part of our obligation to the community, although we are also looking for the PR."

Many of the schools that will receive a free Apple system already have one or more computers. Incredibly, neither state officials or Apple personnel know how many computers are now installed in California schools. Steve Scheier said that for some schools, this will be their tenth (or more) computer; for many others, it will be their first.

Peer Tutoring

Skeptics have raised the question: "What good does one computer per school do?" One dramatic answer to this question lies in the work of Interactive Sciences, Inc., of Palo Alto, CA, a non-profit organization with whom Apple is working. Interactive Sciences is currently testing a method they call Peer Tutoring in a Palo Alto middle school (junior high school). Believe it or not, Peer Tutoring allows a single computer to make the entire student body of an average school computer literate during a single school year or less. In Peer Tutoring, each student teaches two others what he has learned. Interactive Sciences has discovered that an entire semester course is not needed to instruct students in how to use and program a computer. Instead of a conventional computer class, a "pull-out" system is used. Students come out of class one hour per week for eight to ten weeks to learn computer programming. Then they tutor two other students for a second eight to ten week period.

What good does one computer per school do?

Jeff Levinsky, Director of Research for Interactive Sciences, cites numerous advantages to Peer Tutoring, including:

- The direct learning is far more interesting than if done using a text book or conducted in a class with many students.
- The method of learning is faster because there is always someone there to help.
- The students learn even more fully because after they have taken their instruction, they tutor other students. Thus, students learn by teaching.
- The program overcomes the serious

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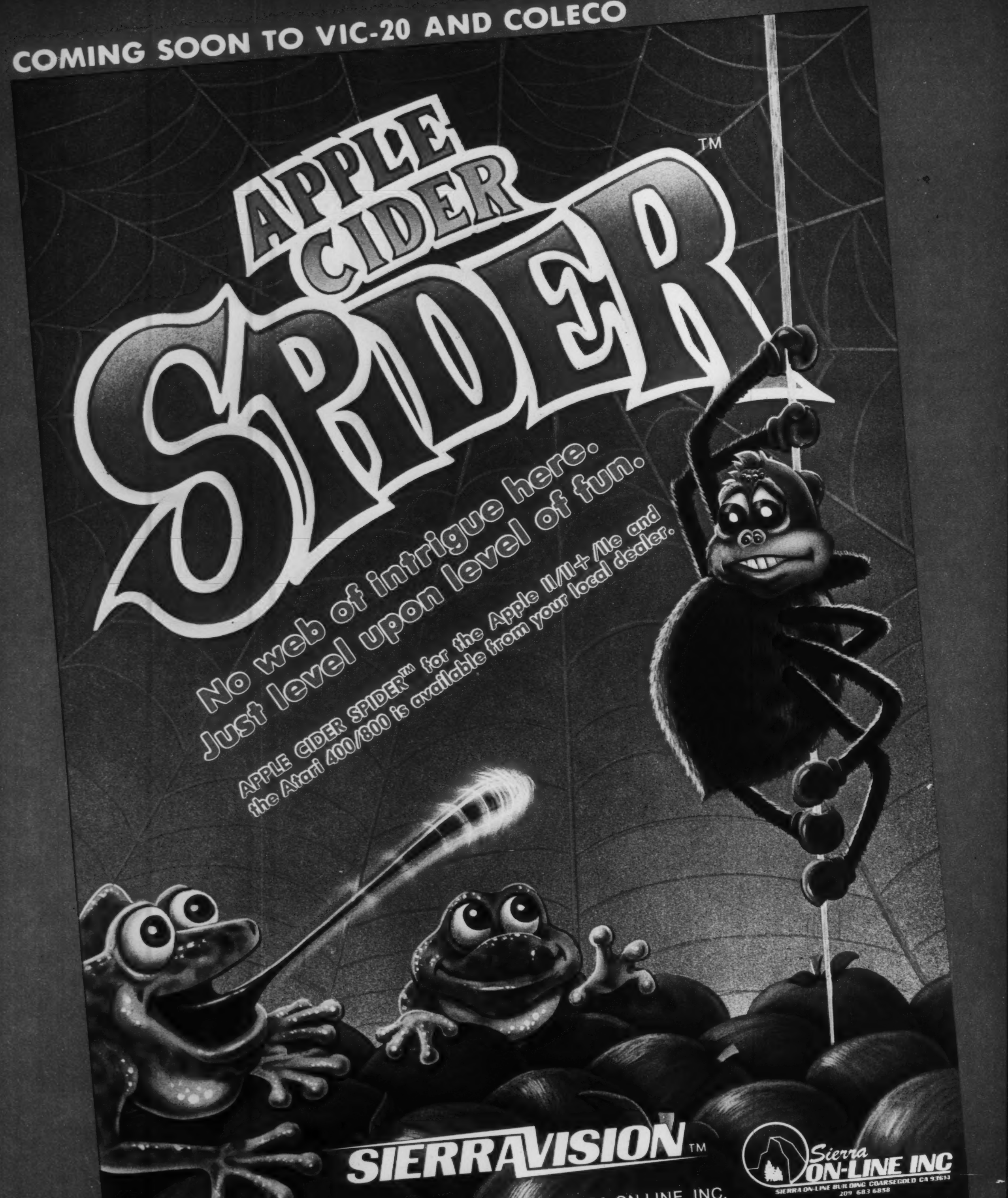
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problem in getting girls interested in computers. With Peer Tutoring, there is a social, interactive situation in which girls are taught by other girls.

- Three students use a single computer at one time.

Jeff estimates that with just one computer, assuming three youngsters per session, six days per week, seven time slots per day, well over 100 students can be exposed to the computer each week. Because the students at the test school have been so enthusiastic about the program, the computers are usually used during evenings and on weekends as well. The program was put on a volunteer basis, yet 90% of the test school students chose to participate.

The Peer Tutoring test has resulted in some students instructing teachers in how to use the computer and, in some cases, teaching their parents as well. The foundation also works with a senior citizen center; one graduate of this program is 93 years old.

Interactive Sciences is preparing a brochure explaining Peer Tutoring. They are also putting together a one-hour lesson, in the form of an eight-page pamphlet, which describes Peer Tutoring and gives directions to the tutor.

Jeff welcomes inquiries from educators and others interested in the program. Write to: Jeff Levinsky, Director of Research, Interactive Sciences, Inc., 1010 Harriet St., Palo Alto, CA 94301, or call (415) 856-1954.

Teacher Education

The push for computer literacy is being stimulated by the State of California as well. In January, 1983, the state set up 15 Teacher Education and Computer Centers (TECCs) around the state. Their purpose is to provide teachers with training in mathematics and computer science. As part of the KCW project, Apple is providing five free Apple IIe systems to each TECC. William Honig, the recently elected State Superintendent of Public Instruction, is pushing for legislation which will require all students to pass a computer literacy test as a requirement for graduation from high school.

The Apple Logo provided with the KCW package comes on two disks. Apple representatives stress that this is not merely a simple elementary school student programming language with simplistic turtle graphics. They claim it is a language that teaches students up through high school level how to program.

What Others Are Doing

Apple and other computer companies are working with Washington legislators to establish similar tax breaks nationally. The American Electronic Association (whose members include Apple, IBM, Tandy Corporation and a host of other computer manufacturers) has worked toward getting Senate Bills 1194 and 1195 introduced during 1983. These bills provide for deductions beyond the cost of donated equipment, up to a maximum of 200% of the cost of the equipment.

You may well wonder, as did I, if the California and U.S. bills in combination might mean an actual profit to computer donors because of duplicate tax benefits.

Other computer companies are taking advantage of the new California law as well.

An Apple lawyer commented, "I doubt if federal legislation would allow a profit on the deal. But right now, it is hazy what overlap, if any, will occur."

Other computer companies are taking advantage of the new California law as well. Early this year, Hewlett-Packard announced a pilot program in which computer equipment is being donated to 14 California high schools. In a different approach from Apple, each school will be given enough equipment to fully supply one classroom. The package includes ten HP-86 personal computers, ten monitors, ten printers, two graphics plotters, twelve disk drives, and a selection of educational software. One Hewlett-Packard person is assigned on an "on-call" basis to work with each school. The value of the donation is $51,000 per school, for a total corporate gift of $714,000.

Hewlett-Packard plans to conduct an evaluation conference with participating educators to assess the efficacy of the program. Then they will determine what future educational donations or programs, if any, should be established.

IBM announced a program in late March. They are donating 1500 IBM Personal Computer systems to schools in New York, California, and Florida. Eighty-six high schools and 12 teacher training facilities will receive IBM systems. The three states were selected because IBM has major facilities in each of them. Only the California donations are subject to a special tax credit; in New York and Florida, only the standard tax deductions are expected to apply.

The gift to each school includes a 128K IBM PC, a color monitor, two disk drives, a printer, and a selection of IBM software, including DOS 2.0 and Pascal 2.0. The retail value of each system is about $4800. In addition, each school will be given a $10,000 cash grant to help in setting up the program. The total value of the donations is approximately $8 million.

The Future

Up until now, I must admit to having been skeptical over the widespread futuristic talk about how all the kids in the country will soon know how to use computers. However, I am rapidly getting the feeling that most young America will be computer literate before too long, particularly if:

- The so-called Apple Bill is passed in Washington.
- Most states follow Honig's lead in requiring computer skills to graduate from high school, and
- Schools across the nation start using programs like Peer Tutoring.

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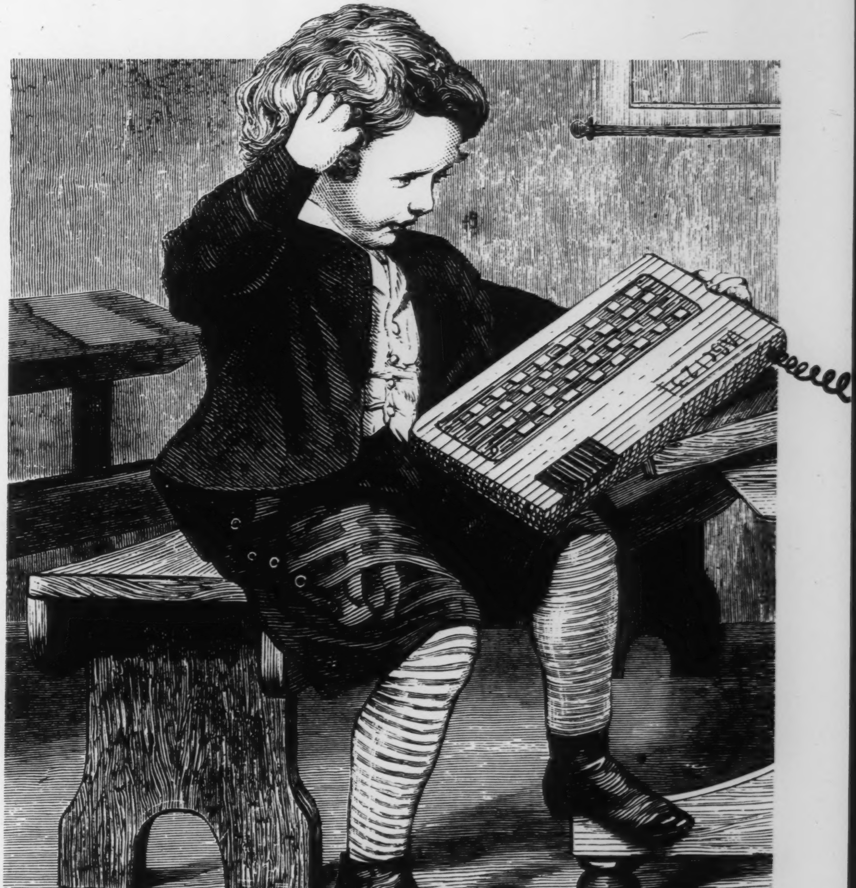
School Uses of Microcomputers

David H. Ahl

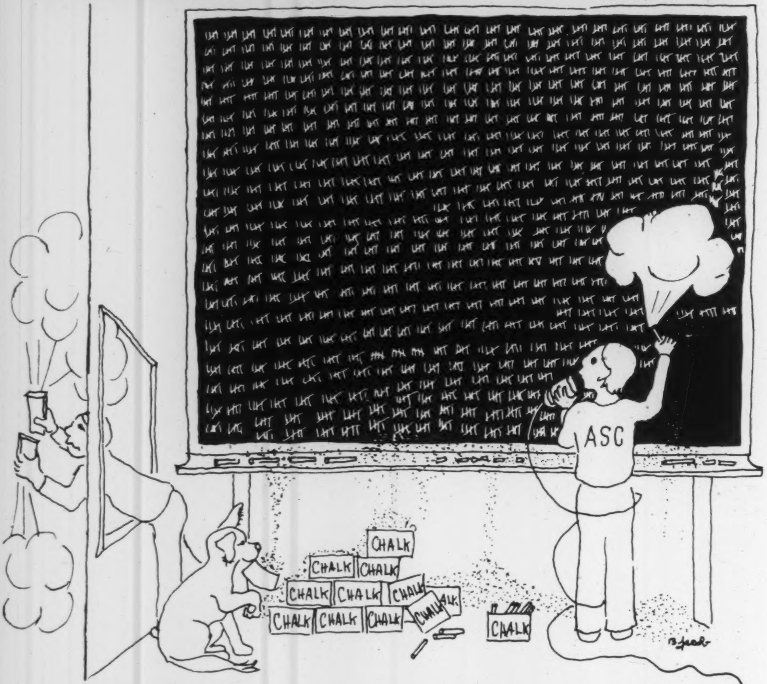
The Center for Social Organization of Schools at The Johns Hopkins University has been conducting a study, the National Survey of School Uses of Microcomputers. Two reports have been issued to date, one in April 1983 and the second in June. Some of the findings are quite intriguing and contrary to what many people think is happening in schools.

Rather than presenting all of the results of the studies here, we will summarize a few results and present highlights of others. Because more secondary schools have computers than elementary schools, and because they have more of them the overall picture of how schools use computers is affected strongly by their use in secondary schools. Later reports will describe use in high schools, middle schools, and elementary schools separately.

In about half of the schools with computers, only one or two teachers, at most, are regular users. Where more than one or two teachers are involved it is most often by using packaged learning games or drill-and-practice programs. However, since elementary students use the computer for drill and learning games, on average, less than 15 minutes per week, they do not have sufficient time for any appreciable skill building to take place. Thus the effect of using drill-and-practice programs is really to acquaint the students with the computer (literacy), and not truly for subject matter learning, no matter what the teachers might think.



15K MEMBERS AND GROWING



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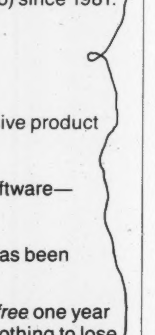

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School Uses, continued...

In the schools with computers, about one student in seven actually uses it during any given week. However, in a third of the elementary schools about 40% of the students have had some contact with the computer whereas this is true for only one out of every eight secondary schools.

Schools vary a great deal in how much their computers are in use. On average, computers are used by students for two to three hours per day. However, some schools use their computers less than that; over 20% of the schools use their computers less than one hour per day. In the heavy-using 20%, computers are in use for more than five hours per day.

Given this rather low usage, it should not be surprising to learn that the average elementary student gets less than 25 minutes of computer use per week and that one third of the students get less than 15 minutes per week.

Because secondary schools have more computers on average, have fewer users, and use their computers for more hours per week, the average secondary school student gets more than 45 minutes per week on the machine. Thus, secondary students have about twice as much access time per week than their elementary counterparts.

Schools with more computer resources can do two things with their relative surplus: extend access to more users or give each user more time. Elementary and secondary schools display dramatically different tendencies in this regard.

Elementary schools with more computers do not give more time to student users; they extend usage to a larger number of students. On the other hand, as secondary schools get more computers, they give longer access to the same number of students.

Elementary school usage is divided among computer literacy and writing programs (19 minutes per week), drills and remedial work (13 minutes) and learning games (12 minutes). Because of the small amount of time per user, all of these uses can probably be regarded as different flavors of computer literacy.

In secondary schools, far more time is spent in writing programs (55 minutes per week) and less on drills and remedial work (17 minutes) and learning games (11 minutes). Although relatively rare, students who use computers for word processing, in the business curriculum, or for science laboratory work tend to get large blocks of time. Typically, they get 30 minutes per week, and a third of such students get an hour or more per week.

Further information and newsletters about the project are available from Dr. Henry Jay Becker, Project Director, Center for Social Organization of Schools, The Johns Hopkins University, 3505 N. Charles St., Baltimore, MD 21218. ☐

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The Third Annual International Computer Problem Solving Contest Results

Donald T. Piele

When the bulk of this year's returns for the Third Annual International Computer Problem Solving Contest arrived at the University of Wisconsin—Parkside, the mailroom clerk scratched her head and wondered, "Why are people from all over the United States and several foreign countries sending letters and packages to a mathematics teacher here? More than 100 pieces have arrived today alone!"

We began to wonder what we had gotten ourselves into. Opening each return, scanning the results sheet, and reading the comments enclosed took two hours a day. The stack of program listings and sample runs from teams who reported solving four or five problems correctly was steadily growing—especially in the Elementary Division. All of this occurred, of course, as final exams at the University began; grades were due soon in the registrar's office. Our work for the next two weeks was cut out for us.

One week after the deadline for returning the results, we began to grade the solutions. We spent several days reviewing sample runs and reading program listings. All solutions to a particular problem were compared, and an extra 1-5 points were awarded for ease of reading and simplicity of design. In a few cases, we made comparisons by typing and running the programs. To distinguish between the top two or three results, the programs were compared side by side. Of course, all judgments in style and ease of understanding are subjective and, therefore, difficult—a bit like trying to rank works of art.

Elementary Division winners Brad Perkins and Ethan Straffin.

Elementary Division

The top ranked team in the Elementary Division was a pair of sixth graders, Ethan Straffin and Brad Perkins from Todd School in Beloit, WI. Ethan and Brad worked together to solve all five programs using an Apple II computer. Their solutions were judged to be the best among the twelve teams who solved all five problems correctly. Kent Weber, the Beloit contest director, reported that Ethan and Brad finished the problems in 52 minutes. Aside from the two-hour time limit, the time it takes to solve the problems is not considered in grading the solutions, but it was interesting to know how quickly this pair worked.

This was the first year that a team from Wisconsin had placed number one in any division of the contest. Since Beloit is only an hour's drive from the University, I presented the trophy myself at a special session of the school board to honor outstanding achievements by students in the Beloit School District. After the awards ceremony, I chatted with both young men.

The first thing that Ethan, the team captain, wanted to know was where we had taken points off from their programs. I couldn't answer that because awarding points for design and style is a subjective judgment for all the top teams who solve a particular program. We then talked about what he likes to do with his computer. Ethan, who recently upgraded his equipment from a Vic 20 to a Commodore 64, was working on a Monopoly simulation program with graphics displays of the playing board, rolling of the dice, and detailed overlays of properties when a player lands on them.

Although Brad Perkins, the other half of the winning team, does not have his own computer, he can use the "Apple Orchard"—32 Apple computers in a central facility in Beloit for teaching computer literacy to 2000 children in grades 3 to 6. After school, Brad and other computer club members can use the computers. Brad also likes to write programs that use graphics.

Twelve elementary teams solved all five problems, and among

Donald T. Piele, University of Wisconsin-Parkside, Box 2000, Kenosha, WI 53141.

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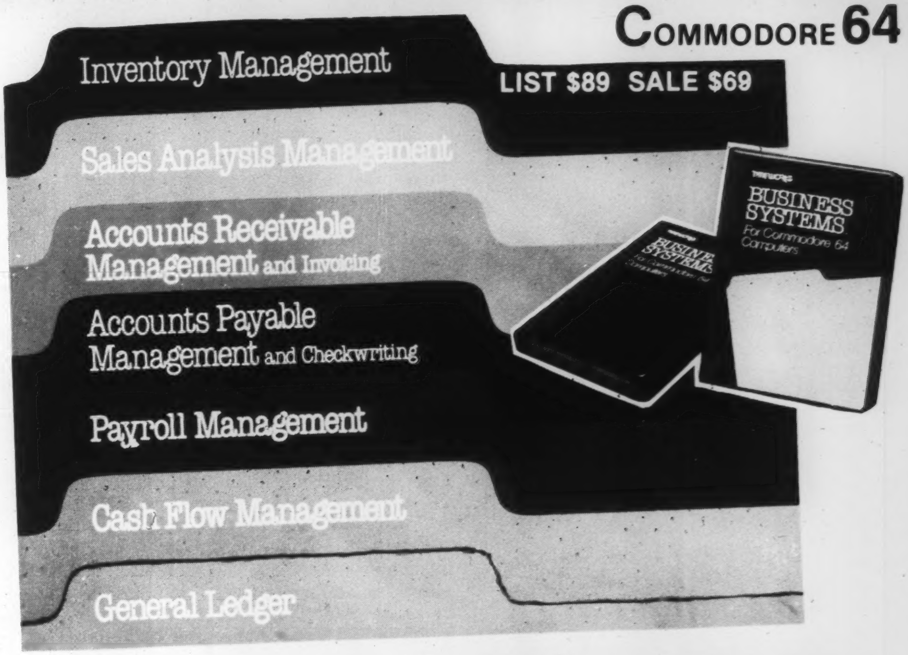
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the top ten teams the difference between the final score was only 6 points. A complete list of the top ten teams appears in Figure 1.

Figure 1. Elementary Division Winners.

Place	Team	School/City
1	Ethan Straffin Brad Perkins	Todd School Beloit, WI
2	Nir Ofer Julie Kerr	Lake Heights School Medina School Bellevue, WA
3	Paul Franklin Mike Parr Brian Workman	Jackson School Morgan Hill, CA
4	Tim Kokesh	Hoover School Bartlesville, OK
5	Andrew Mauer Chris Tuttle Doug Bruha	McKinley School Racine, WI
6	Mike Henry	Tudor School Anchorage, AK
7	Jim Cogbill Jennifer Ledbetter Karina Walters	Chaffin School Ft. Smith, AR
8	Leslie Gibson David Morris	Brian School Willowdale, Ontario, Canada
9	Jason Hagen Ethan Marin	Park Road School Pittsford, NY
10	Kevin Lee John Wolcott	Morley School Lincoln, NE

Junior Division

The first place team in the Junior Division consisted of one competitor, Robert T. Adams, a ninth grader from Woodson High School in Fairfax, VA. Robert and three other teams solved four problems correctly, but his well-constructed and efficient programs put him in the top spot.

During the past year Robert competed in several mathematical contests: the Virginia Mathematics League, Washington Metropolitan Competition, and Atlantic Regional Competition. He likes soccer, football, English, computers, and his mathematics and computer science coach, Andre Samson. "Mr. Samson gives us problems that really make us think," said Robert.

Figure 2. Junior Division Winners.

Place	Team	School/City
1	Robert T. Adams	Woodson High School Fairfax, VA
2	Paul Warshawsky Misha Glouberman	Wagar High School Cote St. Luc Quebec, Canada
3	Tim Patton Rania Huntington Dan Upper	Wisconsin Heights High School Mazomanie, WI
4	Jody McCord	Victoria High School Victoria, TX

The problems for the Junior Division were apparently too difficult this year. We did not receive enough returns with four or more problems solved correctly to be able to rank beyond the top four teams. The top four teams that correctly solved four problems appear in Figure 2.

Senior Division

The Senior Division winner this year also entered as a one-person team: John Rompel from Piedmont High School, Piedmont, CA. John is the first contestant to have his name engraved on two winning trophies; he won the Junior Division title in 1981, the first year of the contest.

Both John and the second place team solved all five problems—an outstanding accomplishment given the difficulty of the last problem. He said it helped that he had worked on a similar eight queens problem before. His solutions were very elegant, well-documented, and easy to read. John, who has a Radio Shack lookalike at home, has been programming professionally for four years for a large software and consulting firm. He loves to work with different operating systems, and he programs in most low and high level languages, including Pascal, C, Fortran, and assembly for the Z-80, 6502, and 8086. A junior this year, John plans to skip his senior year to enter the University of California at Berkeley in the fall, majoring in computer science. A complete list of the top nine teams appears in Figure 3.

Figure 3. Senior Division Winners.

Place	Team	School/City
1	John Rompel	Piedmont High School Piedmont, CA
2	John Gravely David McKinnis David Tilley	Jordan High School Durham, NC
3	Rushika Fernandopulle Phil Koh	Gilman School Baltimore, MD
3	Charles Goricanec Glen Lalonde	Don Bosco High School Toronto, Canada
4	Spencer Greene Truman Joe	Klein High School Spring, TX
4	Tom Kreyl Tom While Mark Braun	Livonia High School Livonia, NY
4	Brian Kelley John Slaughter	Winfield High School Winfield, WV
4	John Abbott Mike Henry Jeff Pelletier	Mona Shores High School Muskegon, MI
4	Michael Silver John Mellor	Highland High School Bakersfield, CA

Statistics

Each contest director was asked to return the results form from his local contest. The form, which summarizes the local results,

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helps us evaluate the difficulty of the problems. We used these returns to compile the overall average results (Table 1).

Table 1. Average Results.

	Elementary	Junior	Senior
Number of teams.	5	4	7
Average Score	25	13	21
Average number of problems solved	1.5	.7	1
High Score	72	33	53
Highest number of problems solved	3.9	1.7	2.8
Solutions to #1	3.6	1.2	3.8
Solutions to #2	1.3	.9	2
Solutions to #3	1.8	.4	1
Solutions to #4	1.7	.9	2.7
Solutions to #5	1	0	.2

As the statistics confirm, the junior division problems were much too difficult this year. Last year, the junior division problems were too easy, so we increased their difficulty. Apparently our adjustment went too far. The senior division problems were just slightly too hard. Had we started out with a simpler first problem, we could have avoided this; we learn something every year.

Feedback

The comments that we received this year were very informative and useful. In general, directors of contests with stronger and more experienced teams didn't mind the difficulty of the problems as much as those who were new to the contest. Junior division teams were especially hard hit, and some directors thought that there was not enough difference between the junior and senior levels. Many people believed that we should have at least one elementary problem—a confidence builder—that most entrants could solve.

The next major concern was the wording of some problems. Problem #2—De Bug was not stated as clearly as it should have been. A less-than sign was missing in the problem, which caused the output of some teams to look different than our sample runs. It was easy to think of the output in a slightly different way too. Most judges understood the problems here and accepted the different output.

"This computer football game is really realistic. The players even go on strike!"

A few judges complained about the difficulties of grading a simulation problem. The problem is that one can't be sure the program is correct by looking at the sample run because the runs are all different. Finally, some directors thought that senior problem #3, Factorial Power, was too tricky. It asked the student to compute the right-most non-zero digit in the decimal representation of N! without actually computing all the digits in N!. Many very good students kept only one significant digit in their computations, which proved to be insufficient. Two teams pointed out afterward that even our sample solution, which kept two significant digits at each step, would not work for all numbers between 1 and 500. Our solution gave the correct results for the test numbers required in the problem, but failed for a few numbers between 1 and 500 that we did not try. It was noted that it is necessary to keep three significant digits at each step to solve the problem correctly. We out-tricked ourselves on this one.

Recommendations

The response to the contest this year was tremendous. It is very satisfying to know that people find our contest interesting and useful in their computer program, but a little scary. We thought we were just having a little fun with computer problem solving challenges, and now we get calls from organizations that are planning to sponsor a statewide contest for thousands of students! We estimate that at this year's 465 contest sites worldwide, about 10,000 students participated in our contest.

Consequently, we think that we must try to improve the contest for all the students involved while keeping our emphasis on problem solving. In addition to trying to eliminate tricky problems and making the problems easier to read, we are considering a few improvements for next year:

- Make two problems very simple to ensure that more teams solve at least one problem correctly.
- Keep two problems at the intermediate level.
- Keep the fifth and final problem difficult so that only the very best teams are able to solve it.
- Provide an algorithm to generate random numbers for all simulation problems so that correct sample runs give expected results. This will make them easier to judge.
- Establish the last Saturday in April as the official date of each year's contest. The preceding Friday will always be the alternative date for schools that are unable to hold the contest on a Saturday.
- Send registration forms and information in December to all contest directors who participated the previous year and to others who ask to be placed on our mailing list.

Conclusion

Outstanding teams were commended locally, usually in newspaper articles or with a trophy. Because of limited time and resources, we can judge only the very best results from all over the world. The winning international team members have their names engraved on one of three traveling trophies, which they keep for one year. (A trophy was added this year for the elementary division.) Placing in the contest is a significant achievement; we enjoy watching it happen and publicizing the results.

Finally, we wish to thank all the local area contest directors, contest duplicators, judges, and team members for helping to make the contest possible this year. As many contest directors told us, "Wait 'til next year!"

Post Script

Next year's contest will be held on Saturday, April 28, 1984. For those who cannot hold the contest on a Saturday, the alternative date is Friday, April 27. To obtain a registration form, send your name and address to: Donald T. Piele, University of Wisconsin-Parkside, Kenosha, WI 53141. □

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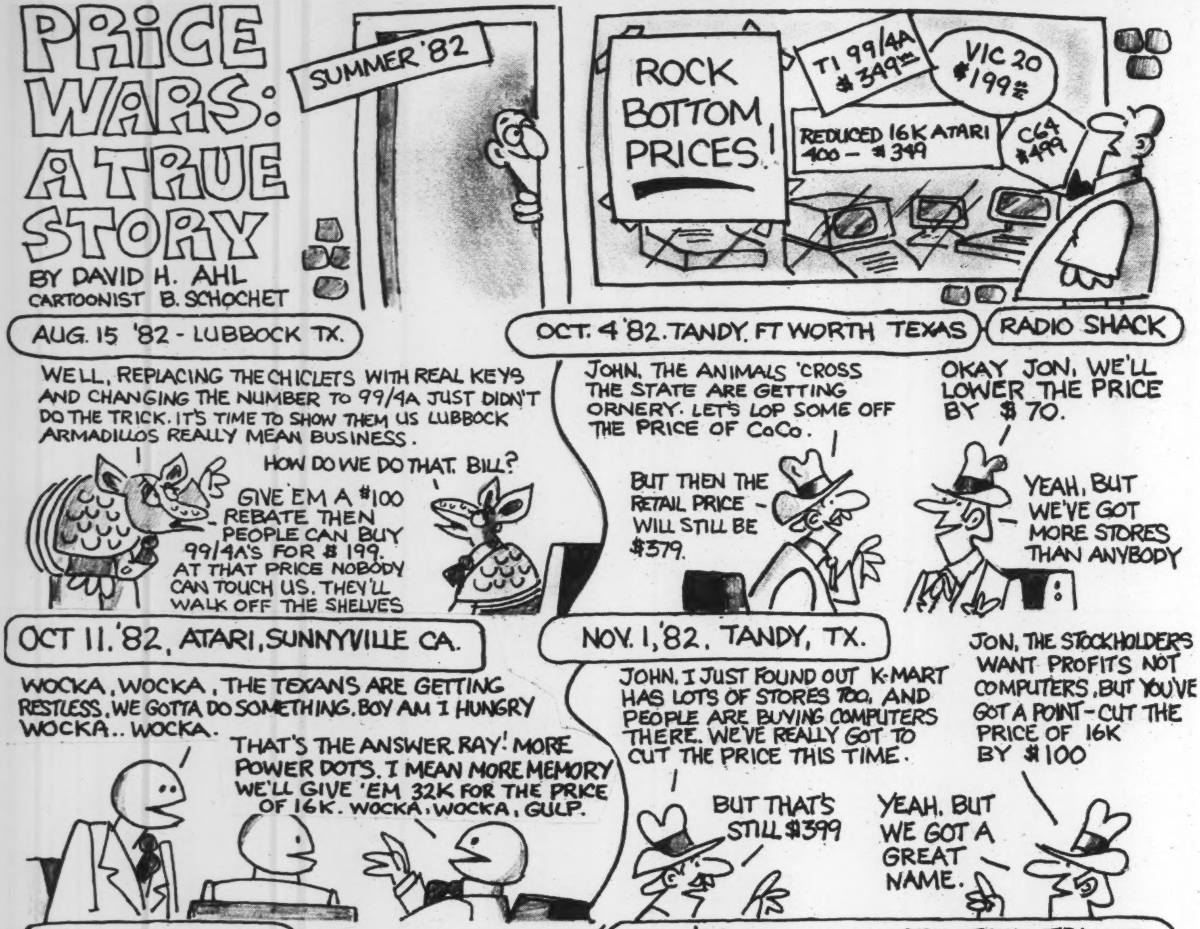
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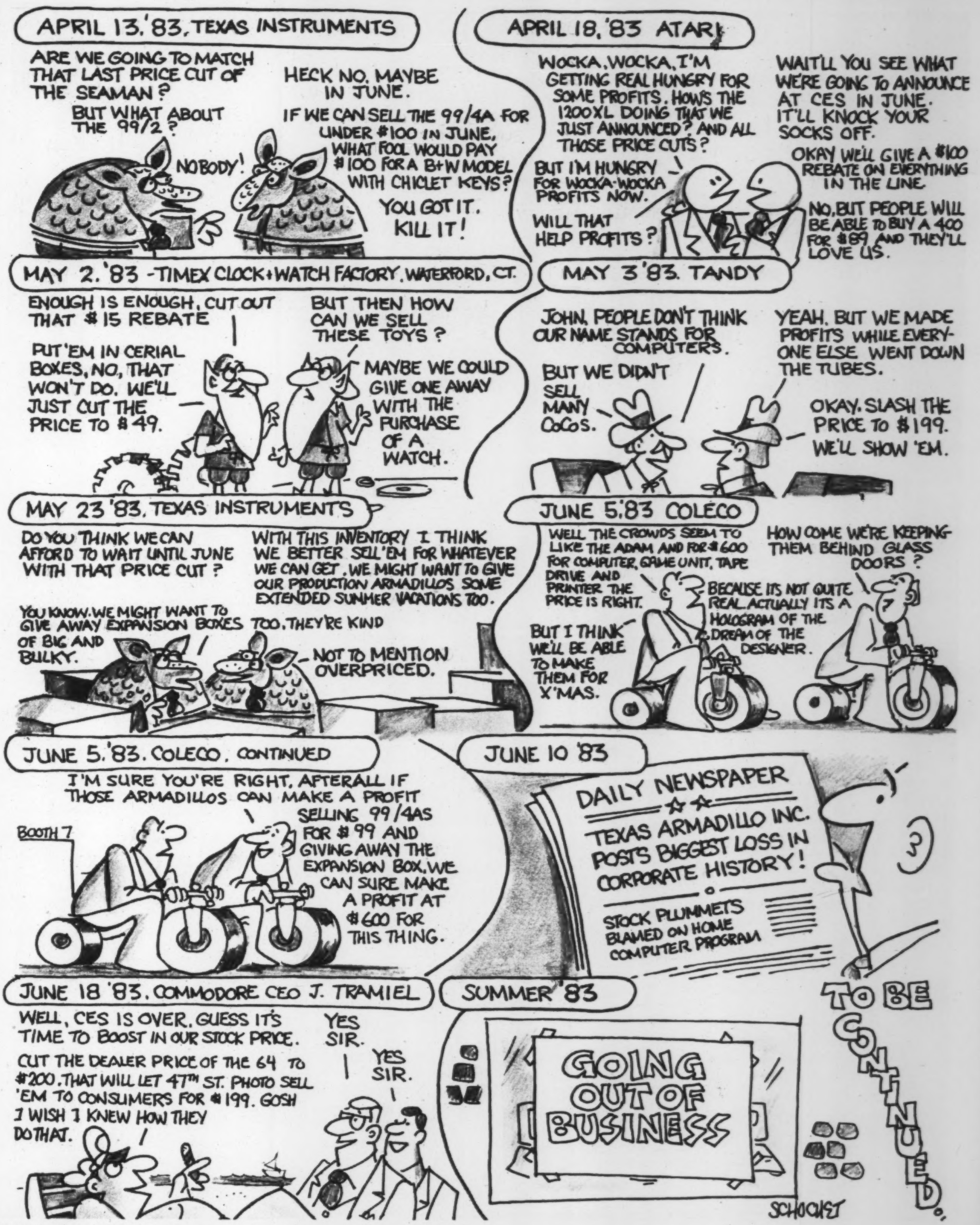
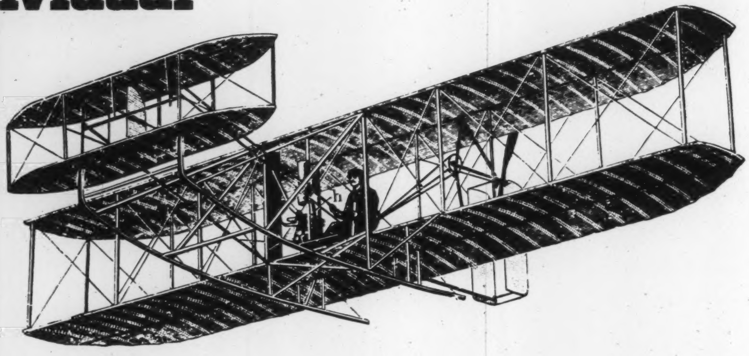
BUT THEN THE RETAIL PRICE WILL STILL BE $379.
YEAH, BUT WE'VE GOT MORE STORES THAN ANYBODY
OCT 11. '82, ATARI, SUNNYVILLE CA.
WOCKA, WOCKA, THE TEXANS ARE GETTING RESTLESS. WE GOTTA DO SOMETHING. BOY AM I HUNGRY WOCKA.. WOCKA.
THAT'S THE ANSWER RAY! MORE POWER DOTS. I MEAN MORE MEMORY WE'LL GIVE 'EM 32K FOR THE PRICE OF 16K. WOCKA, WOCKA, GULP.
NOV. 1, '82. TANDY, TX.
JOHN, I JUST FOUND OUT K-MART HAS LOTS OF STORES TOO, AND PEOPLE ARE BUYING COMPUTERS THERE. WE'VE REALLY GOT TO CUT THE PRICE THIS TIME.
JON, THE STOCKHOLDERS WANT PROFITS NOT COMPUTERS, BUT YOU'VE GOT A POINT - CUT THE PRICE OF 16K BY $100
BUT THAT'S STILL $399
YEAH, BUT WE GOT A GREAT NAME.
DEC. 20, '82 - ATARI
WOCKA, WOCKA I DON'T THINK OUR 32K MEMORY WAS A HIT OF THE CHRISTMAS BUYING SEASON, WE'VE GOTTA GET 'WOCKA' SERIOUS.
HOW ABOUT SELLING THE COKE-PROOF KEYBOARD ONE FOR $200 AND THE REAL KEYBOARD ONE FOR $500. NOBODY'LL TOUCH US THEN.
I'M STILL HUNGRY 'WOCKA-WOCKA.
OKAY, WE'LL PUT 48K IN THE 800 TOO.
JAN 10, '83 - COMMODORE C.E.O. JACK TRAMIEL
I THINK ITS TIME TO MAKE OUR STOCK RISE ANOTHER 50 POINTS. ANNOUNCE THAT WE'LL SELL THE 64 IN SUPERMARKETS FOR $400 AND THE TOY FOR $139.
YES SIR!
YES SIR!
WHAT?
BUT CAN WE PRODUCE ENOUGH?
FEB. 14, '83. TEXAS INSTRUMENTS
WE'VE GOT TO SQUASH THAT PESKY SEAMAN. LET'S CUT THE DEALERS PRICE BY $48 AND CONTINUE OUR $100 REBATE.
BUT, WHAT ABOUT OUR PROFITS?
PROFITS, SMOFITS, WE'LL MAKE IT UP IN VOLUME.
BUT THAT MEANS THAT YOU CAN BUY A 99/4A FOR $149!
AND IT'S WORTH EVERY PENNY OF IT.
APRIL 4. '83 - COMMODORE C.E.O. J TRAMIEL
TIME FOR ANOTHER STOCK PRICE RISE. YOU JUST CAN'T HAVE ENOUGH OF THOSE.
CUT THE PRICE ON THE PERIPHERALS FOR THE TOY, SO DEALERS CAN ADVERTISE A VIC FOR UNDER $100.
YES SIR.
YES SIR.


APRIL 13.'83. TEXAS INSTRUMENTS
ARE WE GOING TO MATCH THAT LAST PRICE CUT OF THE SEAMAN?
HECK NO. MAYBE IN JUNE.
BUT WHAT ABOUT THE 99/2?
IF WE CAN SELL THE 99/4A FOR UNDER $100 IN JUNE, WHAT FOOL WOULD PAY $100 FOR A B+W MODEL WITH CHICLET KEYS?
NOBODY!
YOU GOT IT. KILL IT!
APRIL 18.'83 ATARI
WOCKA, WOCKA, I'M GETTING REAL HUNGRY FOR SOME PROFITS. HOW'S THE 1200XL DOING THAT WE JUST ANNOUNCED? AND ALL THOSE PRICE CUTS?
WAIT'LL YOU SEE WHAT WE'RE GOING TO ANNOUNCE AT CES IN JUNE. IT'LL KNOCK YOUR SOCKS OFF.
BUT I'M HUNGRY FOR WOCKA-WOCKA PROFITS NOW.
OKAY WE'LL GIVE A $100 REBATE ON EVERYTHING IN THE LINE.
WILL THAT HELP PROFITS?
NO, BUT PEOPLE WILL BE ABLE TO BUY A 400 FOR $89 AND THEY'LL LOVE US.
MAY 2.'83 -TIMEX CLOCK+WATCH FACTORY. WATERFORD, CT.
ENOUGH IS ENOUGH. CUT OUT THAT $15 REBATE
BUT THEN HOW CAN WE SELL THESE TOYS?
PUT 'EM IN CERIAL BOXES, NO, THAT WON'T DO. WE'LL JUST CUT THE PRICE TO $49.
MAYBE WE COULD GIVE ONE AWAY WITH THE PURCHASE OF A WATCH.
MAY 3'83. TANDY
JOHN, PEOPLE DON'T THINK OUR NAME STANDS FOR COMPUTERS.
YEAH. BUT WE MADE PROFITS WHILE EVERYONE ELSE WENT DOWN THE TUBES.
BUT WE DIDN'T SELL MANY CoCoS.
OKAY. SLASH THE PRICE TO $199. WE'LL SHOW 'EM.
MAY 23'83. TEXAS INSTRUMENTS
DO YOU THINK WE CAN AFFORD TO WAIT UNTIL JUNE WITH THAT PRICE CUT?
WITH THIS INVENTORY I THINK WE BETTER SELL 'EM FOR WHATEVER WE CAN GET. WE MIGHT WANT TO GIVE OUR PRODUCTION ARMADILLOS SOME EXTENDED SUMMER VACATIONS TOO.
YOU KNOW. WE MIGHT WANT TO GIVE AWAY EXPANSION BOXES TOO. THEY'RE KIND OF BIG AND BULKY.
NOT TO MENTION OVERPRICED.
JUNE 5.'83 COLECO
WELL THE CROWDS SEEM TO LIKE THE ADAM AND FOR $600 FOR COMPUTER, GAME UNIT, TAPE DRIVE AND PRINTER THE PRICE IS RIGHT.
HOW COME WE'RE KEEPING THEM BEHIND GLASS DOORS?
BECAUSE ITS NOT QUITE REAL. ACTUALLY ITS A HOLOGRAM OF THE DREAM OF THE DESIGNER.
BUT I THINK WE'LL BE ABLE TO MAKE THEM FOR X'MAS.
JUNE 5.'83. COLECO. CONTINUED
I'M SURE YOU'RE RIGHT. AFTERALL IF THOSE ARMADILLOS CAN MAKE A PROFIT SELLING 99/4AS FOR $99 AND GIVING AWAY THE EXPANSION BOX, WE CAN SURE MAKE A PROFIT AT $600 FOR THIS THING.
BOOTH 7
JUNE 10 '83
DAILY NEWSPAPER
TEXAS ARMADILLO INC. POSTS BIGGEST LOSS IN CORPORATE HISTORY!
STOCK PLUMMETS BLAMED ON HOME COMPUTER PROGRAM
JUNE 18 '83. COMMODORE CEO J. TRAMIEL
WELL, CES IS OVER. GUESS IT'S TIME TO BOOST IN OUR STOCK PRICE.
YES SIR.
CUT THE DEALER PRICE OF THE 64 TO $200. THAT WILL LET 47TH ST. PHOTO SELL 'EM TO CONSUMERS FOR $199. GOSH I WISH I KNEW HOW THEY DO THAT.
YES SIR.
SUMMER '83
GOING OUT OF BUSINESS
TO BE CONTINUED.
SCHOCKET

Part 2

Profile Of The Creative Individual



This article is the second in a two-part series on the creative individual. The first part appeared in the August 1983 issue of Creative Computing.

Eugene Raudsepp

Despite the contemporary trend toward specialization in almost every occupation and profession, there is a growing realization that no specialist can make a significant contribution in his field of endeavor unless he is well versed in many fields beyond his own specialization. Many fields have evolved to such a degree of complexity and difficulty that it takes continuous, unremitting study in many diverse areas to be able to function creatively.

The intellectual baggage a person has accumulated during his educational career becomes obsolete only four to seven years after graduation unless he actively continues his education, according to several studies. In addition, it is estimated that in some technical fields as much as a third of a person's time during the workday must be devoted to keeping up with the ever-increasing arsenal of new knowledge. And this cumulative information deals exclusively with the area of a person's specialty. For creative thinking, however, one needs competence that spans a variety of disciplines. Heedful of this, the creative person makes education and the acquisition of new knowledge a vital part of his career design. His goal is to broaden and deepen his intellect without spreading himself thin or becoming pedantic.

The specialist (especially in technological fields) is frequently noncreative because he is unable to see beyond the accepted narrow area of his particular field of specialization. As William J.J. Gordon, founder of Synectics, Inc., points out, "Many highly trained people naturally tend to think in terms of the dogma of their own technology, and it frightens them to twist their conventions out of phase. Their conventions sometimes constitute a background of knowledge upon which they rely for their emotional stability. Such experts do not want cracks to appear. They identify their psychic order with the cosmic order and any cracks are signs of their orderly cosmos breaking up."

Few transcend their subjugation to the traditional and jump beyond the orthodox to original viewpoints and approaches.

The narrow specialist frequently thinks he knows it all and takes inordinate pride in his expertise. When confronted with ideas or approaches that are somewhat unorthodox, he feels compelled to prove, often with convincing logic, that they just wouldn't work. The creative person, with a more open mind and global grasp of things, will often not accept or believe the arguments that the expert advances. He goes ahead, develops his own method of approach, and is frequently successful with problems considered by the expert to be insoluble.

Perhaps the chief danger of specialization, however, is that it emphasizes and demands strict conformity to the accepted dogmas and conventions of a field. Learning to comply with the established dogmas starts early in a person's educational career. By the time he is ready to graduate into original production, he frequently finds that he cannot free himself from its bondage.

Relatively few individuals find the courage to tackle new problems in a new, unconventional manner; only a few transcend their subjugation to the traditional and jump beyond the orthodox to original viewpoints and approaches. The renowned physicist and father of operationalism, P.W. Bridgman, advises that the most important thing for the creative person to remember is merely "to do his utmost with his mind, no holds barred."

This is not to deny the value of mastering the traditional methods and canons of a field. Without mastery of the

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accumulated knowledge of a field which takes a great deal of study and practice, one's compelling hunches may remain mere flashes in the creative pan. The power of originating ideas without skill and knowledge often prevents their full exploitation. Still, the important point is that one cannot afford to be unduly influenced or enslaved by established knowledge. Creativity is the natural enemy of dogma and conformity.

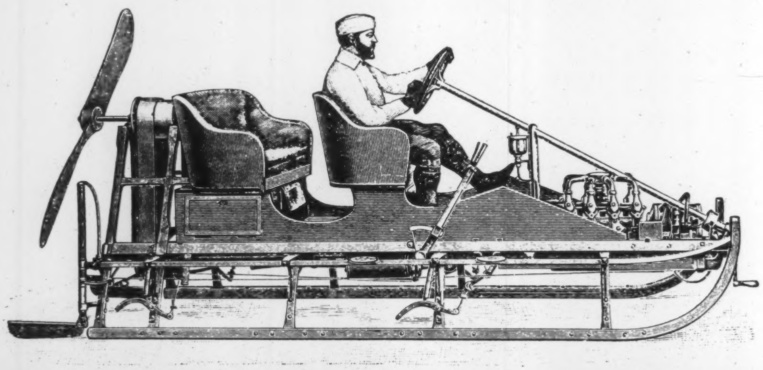
Creative Memory

The unconscious is a vast storehouse of memories: facts, observations, impressions, ideas, and associations. The creative individual's unconscious is always richly stocked with these, but this in itself does not indicate creative ability. Most of us know people who seem to have all kinds of information and facts at their fingertips, yet have never been able to achieve much in a creative way. Often the reason for this is that their memory functions as a rigidly ordered storage of deposited concepts that precludes a flexible and imaginative use of them.

That a prodigious memory can act as a deterrent to creativity is pointed out by scientist Ralph Gerard: "Memory is a desirable attribute; but it is not worthwhile if, as is often the case, one pays for it by having a nervous system that somehow fixes so easily that it loses pliability and the ability to use facts in reasoning and imagining. The general experience has been that the memory wizards are likely to know everything but are not able to do much with it; they are not creative people. There are, of course, notable exceptions; if you happen to be a memory wizard you may also be creative, but the chances are strongly against it."

> ***Creativity is the natural enemy of dogma and conformity.***

What makes memory creative is a state of flux or dynamic mobility in its components. The noncreative memory encapsulates or files its data and impressions neatly into independent groupings, clusterings, and categories, all clearly bounded and demarcated. The creative memory, on the other hand, has permeability in its structural boundaries so that all sorts of related or unrelated



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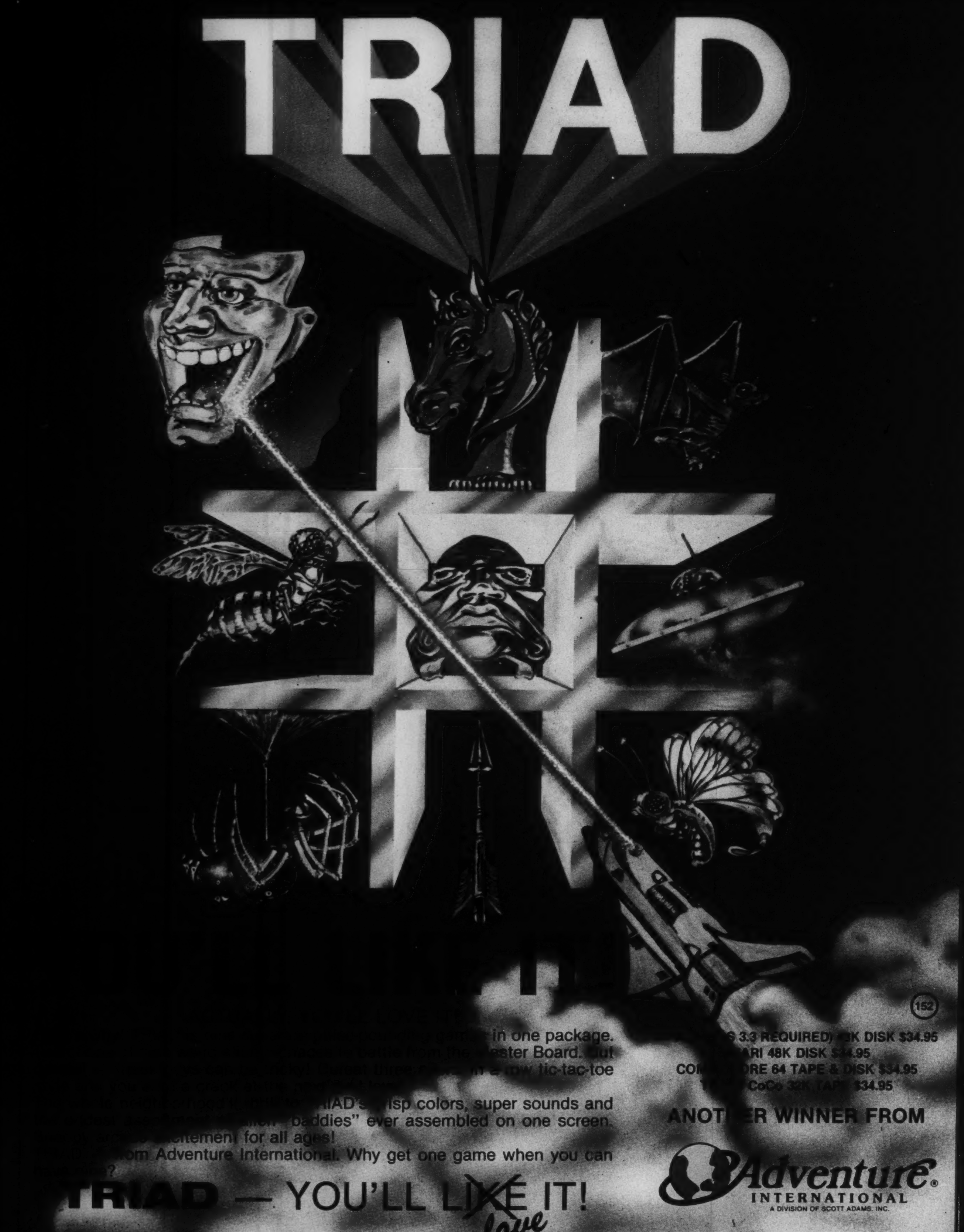

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data, impressions, and concepts can be cross-indexed and interassociated. Furthermore, in the creative individual's unconscious an incessant rearranging, pruning, discarding, and refining of ideas occurs. Such a permeably structured and dynamically fluid memory encourages new combinations of ideas to form.

Thinking In Images

Creative people rely heavily on internal visual imagery or "thought-visions," which are, at times, exceptionally clear and vivid; at other times they can be murky and tied to a tumble of vague, meandering thoughts. Whether clear or cloudy, imagery often contains the kernel of an original idea.

It was an image analogy that started atomic physics. To find an explanation for the atomic structure of elements, Niels Bohr used the image of tiny spheres circling in orbits. For insight into the processes within the atom, he used the image picture of a miniature planetary system. Einstein also claimed that he rarely thought in words. Notions came to him in images, and only later did he try to express these in words. And there are many other noted creative individuals who state that first they try to *feel* or couch in *imagery* what they imagine before naming or verbalizing.

Language, of course, can exert a tremendous influence on both the unconscious direction of thinking and on the way thoughts are finally formed and articulated. But this influence can often be harmful because of the readiness of language to name immediately, to label what is perceived internally. Frequently this limits any further development of the incipient ideas.

Most people are impatient with the vagueness and incoherency of ideas during the beginning stages of the creative process. They feel immediately compelled to force them into the familiar mold of existing frameworks or into language and concepts that invariably fail to do justice to the singular qualities of the perceived novelty. The attempt to crystallize the initially dim or vague creative idea, the eagerness with which most people attempt to snatch it from the void, so to speak, forces on the idea a premature closure that prevents the full range of novelty from finding expression.

The more complicated and difficult a question is, the more we should distrust words.

The precision forced on images and complex thoughts through premature articulation is also fraught with the danger of altering them. The renowned mathematician Jacques Hadamaard states: "I feel some uneasiness when I see that Locke and similarly John Stuart Mill considered the use of words necessary whenever complex ideas are implied. I think, on the contrary, and so will a majority of creative people, that the more complicated and difficult a question is, the more we should distrust words, the more we should feel we must control that dangerous ally and its sometimes treacherous precision."

Philosopher F.S.C. Northrop states that "If one wants to get pure facts, he must go not to physicists or to chemists or to engineers, but to impressionistic painters. They give us the pure qualities, just the impressions, not the objects we infer from them. . . . The person in our society today who shows us what is directly observed is the impressionistic painter. He just paints this field of immediacy with the sensuous qualities and says, 'Now just stop with those and enjoy them.' I believe that one of the greatest sources of creativity is to be found in being pulled back by the modern, Western impressionistic painters to that which is sensed immediately. Only thus are we broken loose from our older inferred theories and enabled to start over again."

What Northrop means is that one should sense what one perceives before articulating it, before making it conceptual or symbolic, or simply, before trying to *understand* it intellectually. In this essentially feeling-sensorial fashion, we can make our perceptions more original and creative. And if we can incorporate observations creatively, then we can also immeasurably increase our capacity to think creatively.

Toying With Ideas

There is often an apparently light side to the creative person's involvement in his work. He tends to become lost in what to an outsider seems irresponsible play with ideas, forms, materials, relationships, concepts, and elements that he shapes into all kinds of incongruous and imaginative combinations. The creative person knows from experience that this seemingly purposeless toying with possibilities strengthens while it loosens his imaginative powers. It is a "letting go" exercise, out of which significant creative ideas often emerge.

Improvisation also serves a very concrete and immediate purpose. It often helps creative individuals to "chance upon" creative solutions to recalcitrant problems that had defied any frontal attack. But most important, playful improvisation and the willingness to view a problem from unusual angles helps capture a mood that facilitates the flow of ideas. Then, one idea will pull out another and, in turn, another, until one idea suddenly commands their full attention because they think that the idea represents something truly novel.

Creative individuals have also learned from past experience that these quasi-serious exercises relax the critical and conservative bent of their consciousness. A light-hearted spirit of play frees them from the habits, conditionings, and conventions that impede the arrival of the new. By putting the judicial censor of their conscious minds to sleep, they can pass over the established order and set the stage for the premiere of fresh ideas and solutions.

Analysis And Synthesis

The creative person is able to analyze

a problem and to perceive the relationships that exist between the parts and the whole. Analysis may seem to be diametrically opposed to creativity, but it is part of the ability to synthesize; prolonged searching and analysis usually precedes creative synthesis. The analysis of a problem and synthesis of elements condition one another and, thus, are complementary aspects of a single process in creative problem solving.

Analysis is necessary because it helps the creative person to break the problem down into manageable elements. To synthesize creatively means to combine or rearrange many elements in a way that results in the formation of a new whole. Thus, the creative person has strong dual abilities, both to abstract the details and particulars and to synthesize or orchestrate a new configuration.

That creative people tend to spend more time in the analytical phases of problem solving than do less creative individuals has been documented by several experiments. For example, psychologist Gary A. Steiner states: "Experiments have indicated that highly creative individuals often spend more time in the initial stages of problem formulation, in broad scanning of alternatives. Less creative individuals are more apt to 'get on with it.' For example, in problems divisible into analytic and synthetic stages, highs spend more time on the former—in absolute as well as relative terms. As a result, they may leapfrog lows in the later stages of the solution process. Having disposed of more blind alleys, they are able to make more comprehensive integrations."

Most people find ambiguity threatening; they choose instead the tried and tested pre-mixed recipes for their cognitive food.

Researchers S.I. Blatt and M.I. Stein reached a similar conclusion with their experiments: "Our more creative individuals spent more time and asked more questions that were oriented to analyzing the problem. Our less creative individuals, on the other hand, spent more time and asked more questions that were oriented to synthesizing the information they had. Our observations suggest that the more creative men were 'feeling out' the problem, attempting to understand it, to become one with it; and, after they understood what they were about, they then integrated what they had learned. Consequently, they spent more time analyzing the problem and less time synthesizing the information they had. Our less creative individuals looked as if they were going to wrench the solution from the problem to dominate it; they 'went after' the answer even before they knew the structure of the problem."

Tolerance Of Ambiguity

For many people a significant reason for the lack of ability to produce creative ideas is their strong preference for precise and concrete thoughts. Consequently, they tend to reject prematurely notions and ideas that do not fit into what they already know or that are too intangible or elusive to permit immediate comprehension and categorization. Many people who prefer clarity and effortless understanding experience any vagueness or vague sense of meaning as a scary, uncomfortable, and sometimes even irresponsible state of mind.

Most people find ambiguity threatening; they choose instead the tried and tested pre-mixed recipes for their cognitive food. The clearly defined and familiar enthrall most people because the new threatens to disturb the secure comfort of the familiar.

As William J.J. Gordon explains: "All problems present themselves to the mind as threats of failure. For someone striving to win in terms of a successful solution, this threat evokes a mass response in which the most immediate superficial solution is clutched frantically as a balm to anxiety. . . . Yet if we are to perceive all the implications and possibilities of the new we must risk at least temporary ambiguity and disorder. Human beings are heirs to a legacy of frozen words and ways of perceiving that wrap their world in comfortable familiarity."

The hold of the familiar precludes the possibility of permitting the unguided imaginative promptings that emerge during the creative process to have spontaneous free play.

The truly creative person is not afraid of disorder or ambiguity. On the contrary, he seems rather attracted to phenomena that are not fully ordered or readily comprehended, and he prefers cognitively challenging and complex situations. As a result, he is aware of and open to the intricate, confusing, and paradoxical qualities of most situations. There is no desire motivated by fear to close out, ostrich-fashion, any conflicting or ambiguous elements he encounters. Like all human beings, he seeks integration and order but is willing to seek it without shutting out the chaotic or the ambiguous; he has little fear of the unexpected or the unknown.

The truly creative person is not afraid of disorder or ambiguity.

In his work he is always ready to relax any binding habit patterns and adheres as little as possible to preconceived plans or stereotyped approaches. He also shows his pliability by being able to consider simultaneously different or conflicting concepts and frames of reference.

In addition, the creative person shows his greater plasticity and adaptability while creating; he respects groping and uncertainty while forming and ordering his thoughts.

Discernment And Selectivity

By overemphasizing the factor of *fluency,* those who have investigated creativity, may have overshadowed the importance of another attribute, often overlooked in the discussions of the creative process—the ability to discern the fundamentals in a problem. The factor of discernment, the sensing of relevance, the intuitive feeling of what is significant, is in some ways opposed to fluency but may be as crucial an attribute for creativity as fluency is.

When confronting a problem, creative people differ from the less creative and the noncreative in the quality of elements they select. They are better able to

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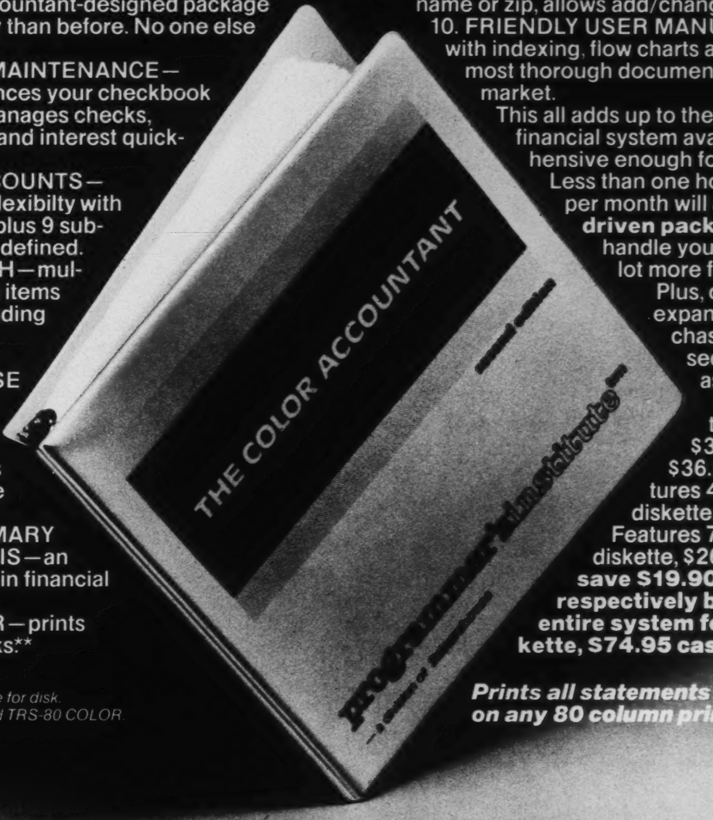

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judge which factors must be taken into account and which can be neglected or discarded without risk of error. They are also able to discard irrelevant ideas, however original, that simply do not fit, whereas a merely fluent person may have his attention tangled amid a jungle of possibilities. In addition, the creative individual shows his selectivity in his ability to organize his work as economically as the objectives allow. He won't allow any superfluous clutter to ruin the elegance of his creative solutions.

In creative problem solving, it is not necessarily the individual who is ebulliently fluent about a problem, nor the person who reaches the highest degree of abstraction in analysis, who shows the most creativity. Whether fluent or not, the individual who can grasp the heart of the matter and has understood the core of a problem, frequently is the most creative.

In creative thinking it is the *quality* that counts and not necessarily the *quantity* of ideas produced. Quantity can add up to nothing if the central point is missed. What counts is the discriminative power to see in an area of experience the relevant and qualitatively significant. Creativity means penetrating to the essence, discerning the crux of the problem, rather than merely exhibiting a wealth of notions and ideas.

The creative individual is guided by a hunch or an intuitive feeling that enables him to exercise choice, taste, and discernment. The intuitive feeling enables him to make valid distinctions in the complex interplay of elements with which he is dealing. Without this feeling, he not only misses much of significance, but is apt to get lost in a welter of irrelevancies.

Tolerating Isolation

When ready to work, the creative person isolates himself from the distractions and interruptions of his environment in order to establish a receptive, leisurely mood. He arranges circumstances so that he can be completely alone and undisturbed to concentrate solely on the creative task at hand.

In addition to his ability to tolerate comfortably long periods of physical withdrawal from others, the creative person can tolerate a measure of psychological isolation. If he works in an organization, he realizes that his capacity to create also requires *psychological distance* from others. This means that he attempts to purge his creative deliberations from considerations such as scheduling, costs, his superior's pet ideas about the approaches to the problem, and most of the other prosaic demands of organizational existence.

One cannot be creative without being out there and alone.

Any extraneous considerations that are grafted onto his problem can block the emergence of new ideas. They can act as barriers by inducing anxiety and guilt feelings because he is not doing what is expected or demanded of him. Ideally, he should be allowed to let his mind work at its own pace and in conformity with its own natural, congenial way. Although the creative person requires periods of privacy and is frequently considered to be a "lone wolf," he is seldom withdrawn, isolated, or uncommunicative.

It should be pointed out, however, that prolonged periods of isolation from others tend to deflate and devitalize rather than enhance his capacity to create. Imagination—when isolated or encapsulated—shrinks and shrivels. It must be nourished occasionally by active participation with others. But the creative person cannot allow undue influence from others. He has to retain a safe margin of social distance to do justice to his creative potential.

Because the creative process is a private and internally motivated affair, the creative individual must have the courage and ego strength to face loneliness when venturing into the unknown. Once he is committed to the no-return path toward the unknown, it is almost impossible for him to rely on somebody else or to share the responsibility and the development of his idea. Although teamwork projects are popular these days, the creative person seldom fulfills his potential through collaboration. In the realm of genuine creativity there is only one solo instrument: the private individual mind and personality of the creator.

As Carl R. Rogers states: "One cannot be creative without being out there and alone;" the extent of the aloneness depends on the extent of the creativity. The more creative the act, the more completely alone one is."

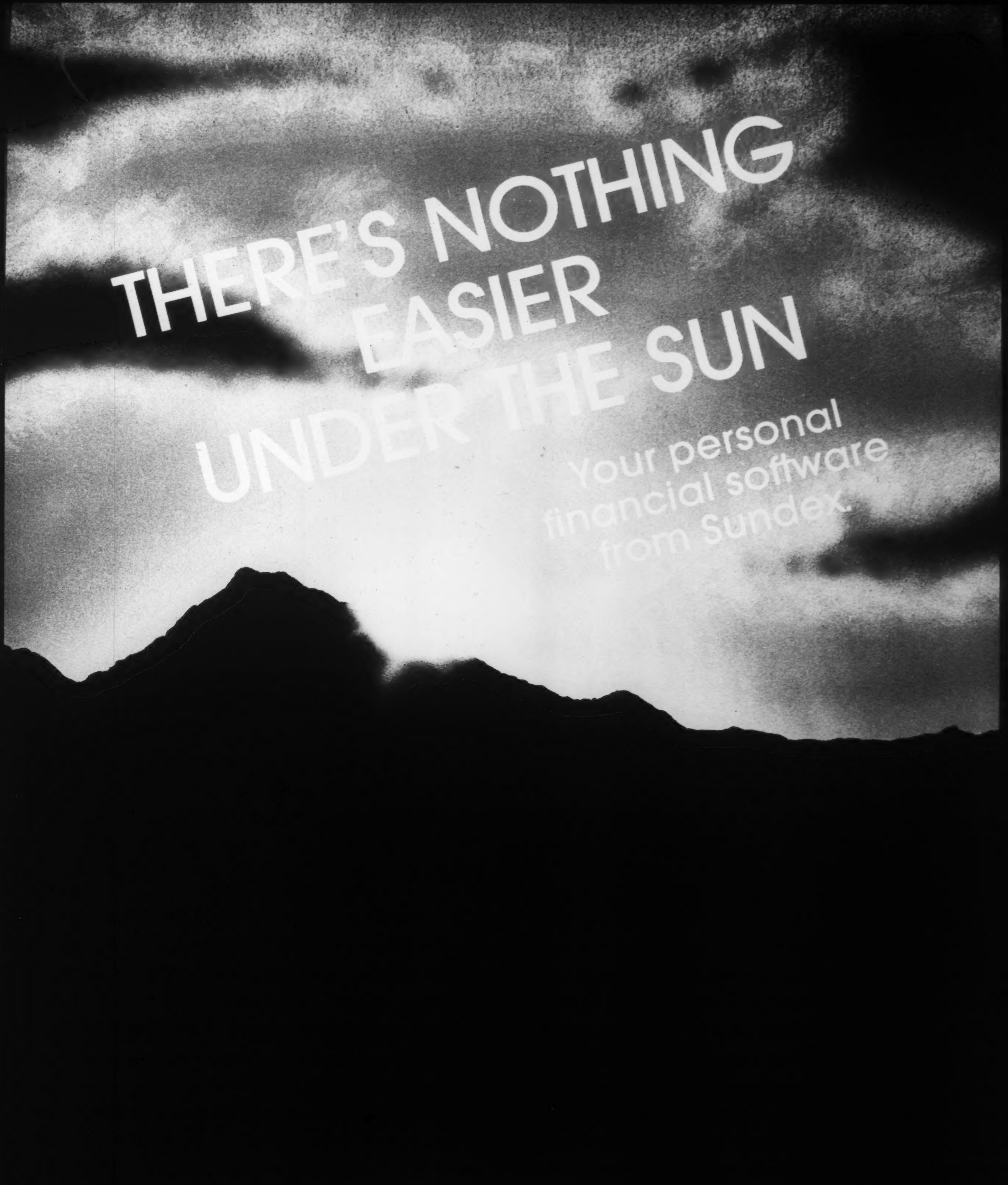
And he frequently needs all the courage and self-confidence he can muster to stand up to the criticisms aimed at his idea, for any radically new idea almost always encounters a mountain of resistance and criticism.

The need for isolation and detachment does not mean that the creative individual can totally dispense with encouragement and recognition. Many things of permanent value have been created only because the creative individual received, at one time or another, a great deal of encouragement and stimulation from somebody. Yet, in the final analysis, he must rely on himself. Support and encouragement can be easily withdrawn and constitute only flimsy crutches on the fragile creative terrain. The condition of self-sufficiency and self-responsibility has to be rooted in the creative person himself.

Incubation

During the creative process, there comes a time when thinking becomes ponderous and clogged, when errors start to pile up and no further new insights occur. This is the time for the creative person to stop his work on the problem and turn to something freer and different. Many creative people find a welcome change of pace in music, painting, sightseeing, manual tasks, daydreaming, reverie, and so on. These activities not only provide a refreshing interlude, but enable his unconscious mental activities the freedom to operate unrestrained by conscious concentration.

Although the creative person spends a great deal of his conscious effort to solve a problem, he realizes the limitations of this effort and finally resorts to incubation. As psychologist John M. Schlien points out: "Although he has confidence in his ability, the creative person also has an attitude of respect for the problem and admits the limits of his conscious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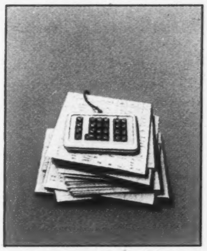

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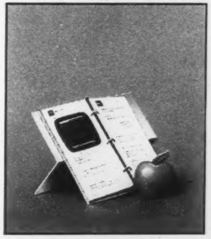

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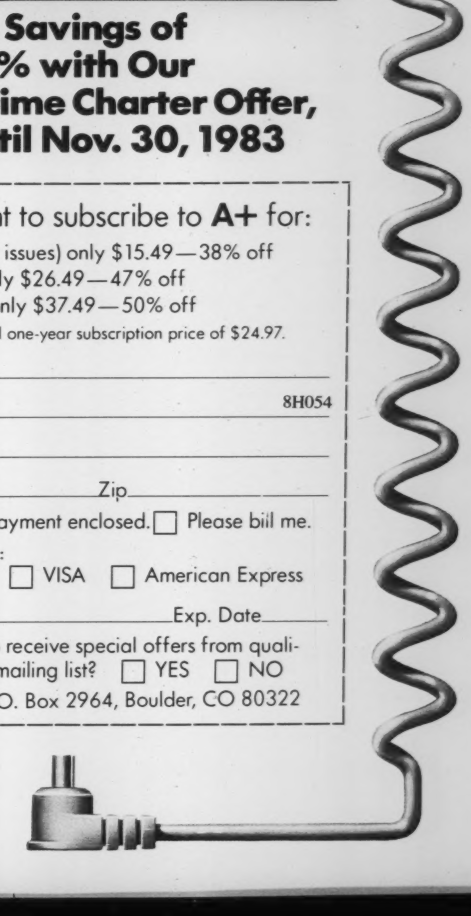

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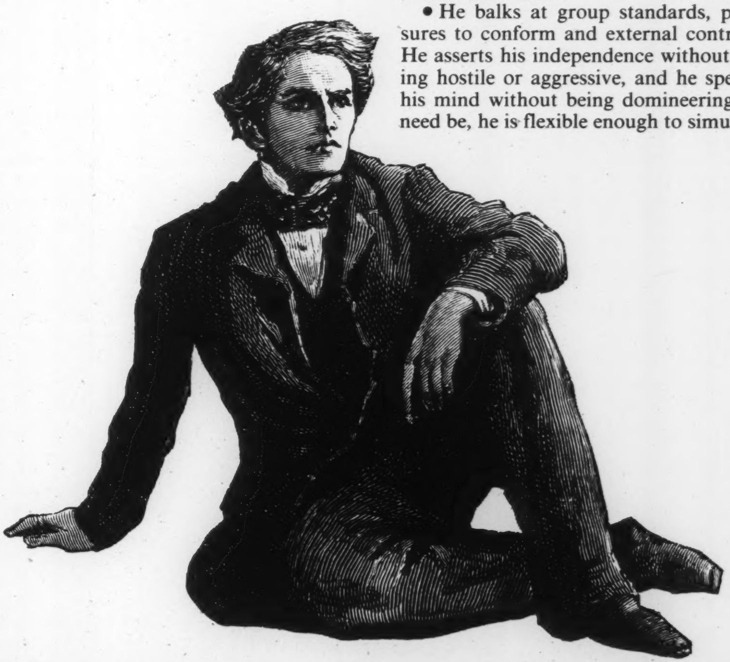
power in forcing the problem to solution. At some point, called 'incubation' by many who have reported the process, he treats the problem 'as if it has a life of its own,' which will, in its time and in its relation to his subliminal or autonomous thought processes, come to the solution. He will consciously work on the problem, but there comes a point when he will 'sleep on it.'"

During the incubation period, the autonomous thought processes in the unconscious take over and continue to solve the problem. Often, when the conscious forcing of the problem to solution has failed, the incubational process succeeds.

Productive Periods

The creative person develops an awareness in *retrospect* of the periods when he solved his problems creatively. He takes note of the methods that were successful and those that failed. He tries to learn why by retracing, as far as he can, the routes he followed and noting those he avoided. He has learned that knowledge of his particular idiosyncrasies and style of creating facilitates his creative process.

He schedules his creative thinking periods for those times when he has his most favorable mental set for producing ideas. He is aware of his personal rhythms and peaks and valleys of output. By keeping a record of those periods during the day or night in which he is most creative, he can establish a pattern and plan ahead, reserving peak periods for concentration and uninhibited thinking, and his less productive time for reading and for gathering information. Even if he has not established a timesheet of productive periods, he has at least developed a sensitivity to those moods that promise really creative returns from his efforts, and he knows when they are approaching.



Other Characteristics

Here are some of the other characteristics that differentiate the more creative individual from the less creative:

Often, when the conscious forcing of the problem to solution has failed, the incubational process succeeds.

- He is more observant and perceptive, and he puts a high value on independent "true-to-himself" perception. He perceives things the way other people do but also the way others do not.
- He is more independent in his judgments, and his self-directed behavior is determined by his own set of values and ethical standards.
- He balks at group standards, pressures to conform and external controls. He asserts his independence without being hostile or aggressive, and he speaks his mind without being domineering. If need be, he is flexible enough to simulate the prevailing norms of cultural and organizational behavior.
- He dislikes policing himself and others; he does not like to be bossed around. He can readily entertain impulses and ideas that are commonly considered taboo; he has a spirit of adventure.
- He is highly individualistic and nonconventional in a constructive manner. Psychologist Donald W. MacKinnon puts it this way: "Although independent in thought and action, the creative person does not make a show of his independence; he does not do the off-beat thing narcissistically, that is, to call attention to himself. . . . He is not a deliberate nonconformist but a genuinely independent and autonomous person."
- He has wide interests and multiple potentials—sufficient to succeed in several careers.
- He is constitutionally more energetic and vigorous and, when creatively engaged, can marshal an exceptional fund of psychic and physical energy.
- He is less anxious and possesses greater stability.
- His complex personality is, simultaneously, more primitive and more cultured, more destructive and more constructive, crazier and saner. He has a greater appreciation and acceptance of the nonrational elements in himself and others.
- He is willing to entertain and express personal impulses, and pays more attention to his "inner voices." He likes to see himself as being different from others, and he has greater self-acceptance.
- He has strong aesthetic drive and sensitivity, and a greater interest in the artistic and aesthetic fields. He prefers to order the forms of his own experience aesthetically, and the solutions at which he arrives must not only be creative, but elegant. Truth for him has to be clothed in beauty to make it attractive.
- He searches for philosophical meanings and theoretical constructs and tends to prefer working with ideas, in contradistinction to the less creative who prefer to deal with the practical and concrete.
- He has a greater need for variety and is almost insatiable for intellectual ordering and comprehension.
- He places great value on humor of the philosophical sort and possesses a unique sense of humor.
- He regards authority as arbitrary, contingent on continued and demonstrable superiority. When evaluating communications, he separates source from content, judges and reaches conclusions based on the information itself, rather than whether the information source was an "authority" or an "expert." ☐

Modular Arithmetic and Computer Art

Matthew Walling
and
David Meger

For thousands of years people have been using mathematical shapes based on precise mathematical formulae to generate artistic designs for everything from architecture to pottery. So it is not surprising that we should find art in number patterns—an art which is created by the direct substitution of colors for numbers. The number patterns that we have chosen to investigate are produced using modular arithmetic.

Although the term modular (or remainder) arithmetic may not be immediately familiar, we use it every day to tell time. The clock is a "mod twelve number system." For example, three hours past ten o'clock is not thirteen o'clock but one o'clock. One is the remainder when thirteen is divided by twelve. In the clock example, zero is the remainder when twelve is divided by twelve, therefore the twelve in the clock should more properly be replaced by zero. Any mod number system, regardless of the dividend, should contain only numbers from 0 to mod-1, and therefore will have repetitive patterns of numbers.

The study of modular (or remainder) arithmetic dates back to the first century A.D. and the Chinese mathematician Sun-Tsu. Recently teachers have been introducing modular arithmetic to junior high students as art in an attempt to generate more enthusiasm for mathematics. The technique involves the use of graph paper, and felt tip pens, crayons, colored pencils, or construction paper.

The students use remainder arithmetic to make a number table of remainders on the graph paper. Number tables are formed by first labelling rows and columns on the graph paper, then filling in the rest of the blocks with the numbers which are the remainders when the row is either added or multiplied by the column and divided by the chosen mod. The remainders are then replaced by colors. Using this technique, one design can take more than an hour to complete. With a personal computer, however, designs can be churned out in rapid succession.

Table 1. Single pattern block for addition mod 7.

+	1	2	3	4	5	6	7
1	2	3	4	5	6	0	1
2	3	4	5	6	0	1	2
3	4	5	6	0	1	2	3
4	5	6	0	1	2	3	4
5	6	0	1	2	3	4	5
6	0	1	2	3	4	5	6
7	1	2	3	4	5	6	0

Table 2. Single pattern block for multiplication mod 8.

X	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	0
2	2	4	6	0	2	4	6	0
3	3	6	1	4	7	2	5	0
4	4	0	4	0	4	0	4	0
5	5	2	7	4	1	6	3	0
6	6	4	2	0	6	4	2	0
7	7	6	5	4	3	2	1	0
8	0	0	0	0	0	0	0	0

The Tables 1 through 4 are typical modular number systems for both addition and multiplication. Figure 1, an example of an addition number system shows a striped pattern. This pattern is observed for all mods using addition Subtraction is the same, but the stripes go in the opposite direction.

For multiplication number systems for even mods (Table 2 and Figure 2) the remainders alternate between even and odd numbers between rows of even numbers. The multiplication number systems using odd mods (Tables 3 and 4 and Figures 3 and 4) have a more complex pattern. All of these systems can be used to generate most unusual patterns.

About the Process

The process of generating remainder number tables is very simple for the computer. With an input statement, the mod is chosen. Then an array of colors versus remainders is formed with another input statement. Two FOR-NEXT loops count rows and columns up to the size of the computer screen. The rows and columns are either added or multiplied. Next the remainder is calculated, the color is set and the point plotted.

The program for the Apple II is shown in Listing 1. It has a short tutorial on modular arithmetic, displays a number system on the screen, displays the Apple color table, and plots the pattern on the lo-res screen.

Listing 2 is written for TRS-80 Color Computer, and Listing 3 is for the TI 99/4. Listings 2 and 3 contain the minimum code necessary for generating the patterns. The TI 99/4 program has the additional ability to plot shapes other than the block to which the other two computers are limited. It can plot any

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shape that can be designed in an eight by eight grid. The block itself can be represented as two colors, one for the background and one for the foreground. With this machine, modular arithmetic art can become quite complex.

Table 3. Single pattern block for multiplication mod 7.

X	1	2	3	4	5	6	7
1	1	2	3	4	5	6	0
2	2	4	6	1	3	5	0
3	3	6	2	5	1	4	0
4	4	1	5	2	6	3	0
5	5	3	1	6	4	2	0
6	6	5	4	3	2	1	0
7	0	0	0	0	0	0	0

Table 4. Single pattern block for multiplication mod 15.

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	0
2	2	4	6	8	10	12	14	1	3	5	7	9	11	13	0
3	3	6	9	12	0	3	6	9	12	0	3	6	9	12	0
4	4	8	12	1	5	9	13	2	6	10	14	3	7	11	0
5	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0
6	6	12	3	9	0	6	12	3	9	0	6	12	3	9	0
7	7	14	6	13	5	12	4	11	3	10	2	9	1	8	0
8	8	1	9	2	10	3	11	4	12	5	13	6	14	7	0
9	9	3	12	6	0	9	3	12	6	0	9	3	12	6	0
10	10	5	0	10	5	0	10	5	0	10	5	0	10	5	0
11	11	7	3	14	10	6	2	13	9	5	1	12	8	4	0
12	12	9	6	3	0	12	9	6	3	0	12	9	6	3	0
13	13	11	9	7	5	3	1	14	12	10	8	6	4	2	0
14	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 1. Addition mod 7: (0)yellow, (1)black, (2)yellow, (3)black, (4)yellow, (5)black, (6)yellow.

Figure 2. Multiplication mod 8: (0)yellow, (1)dark blue, (2)yellow, (3)dark blue, (4)yellow, (5)dark blue, (6)yellow, (7)dark blue.

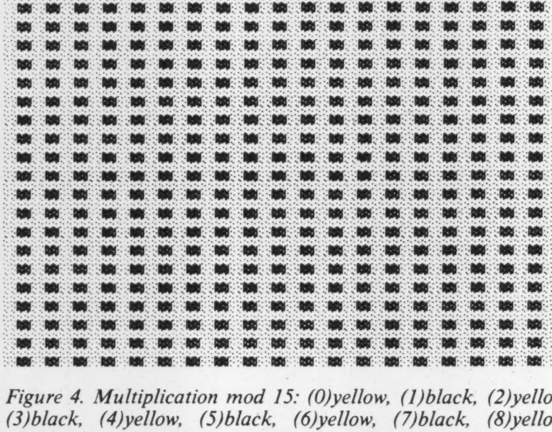


Figure 3. Multiplication mod 7: (0)yellow, (1)dark blue, (2)yellow, (3)dark blue, (4)yellow, (5)dark blue, (6)yellow.

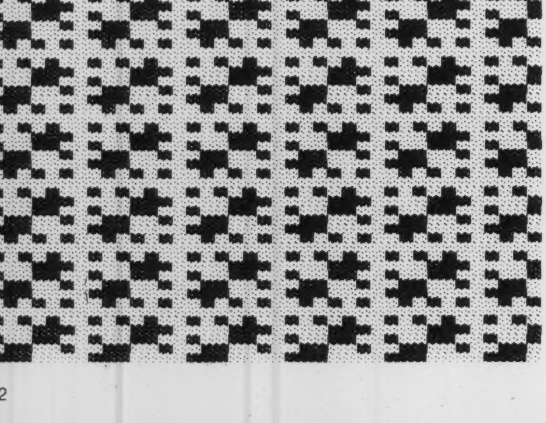
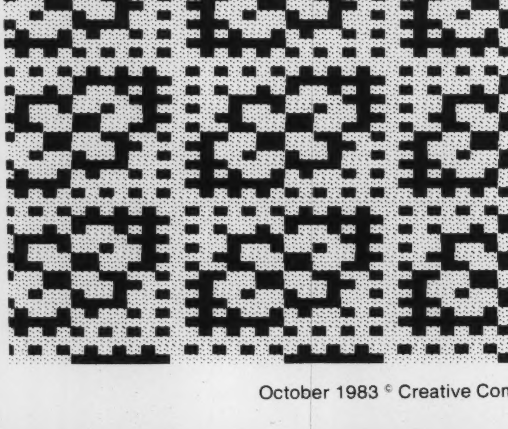


Figure 4. Multiplication mod 15: (0)yellow, (1)black, (2)yellow, (3)black, (4)yellow, (5)black, (6)yellow, (7)black, (8)yellow, (9)black, (10)yellow, (11)black, (12)yellow, (13)black, (14)yellow.



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CIRCLE 200 ON READER SERVICE CARD

Figure 5. Mod 7: (0)blue, (1)blue, (2)white, (3)black, (4)black, (5)white, (6)blue.

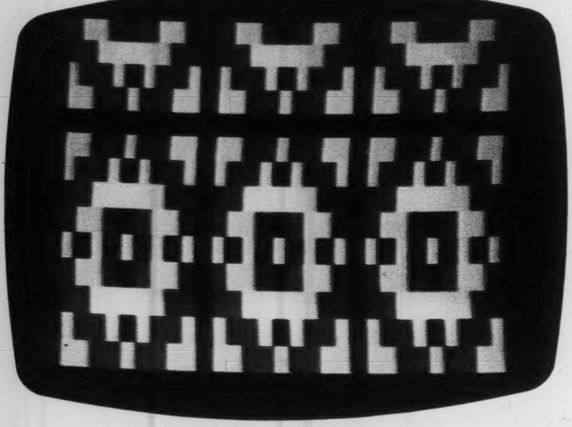


Figure 6. Mod 5: (0)magenta, (1)blue, (2)white, (3)white, (4)blue.

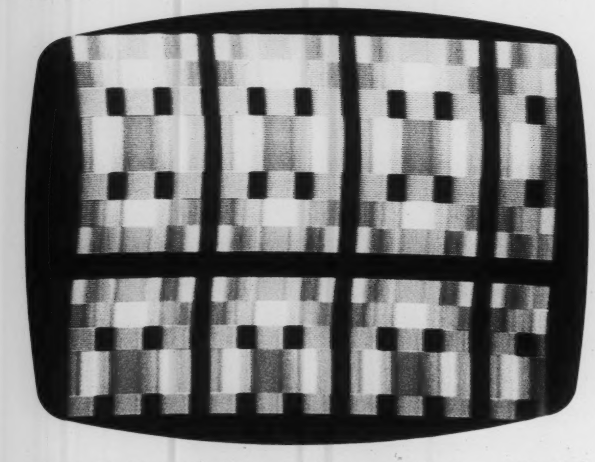


Figure 7. Mod 15: (0)black, (1)yellow, (2)yellow, (3)yellow, (4)blue, (5)blue, (6)blue, (7)black, (8)black, (9)blue, (10)blue, (11)blue, (12)yellow, (13)yellow, (14)yellow.

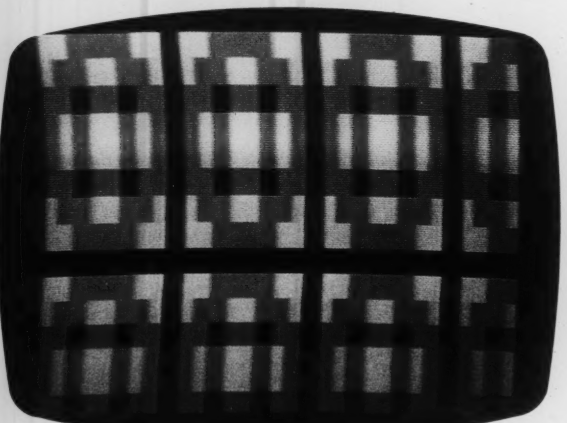


Figure 8. Mod 10: (0)black, (1)yellow, (2)yellow, (3)blue, (4)blue, (5)yellow, (6)blue, (7)blue, (8)yellow, (9)yellow.

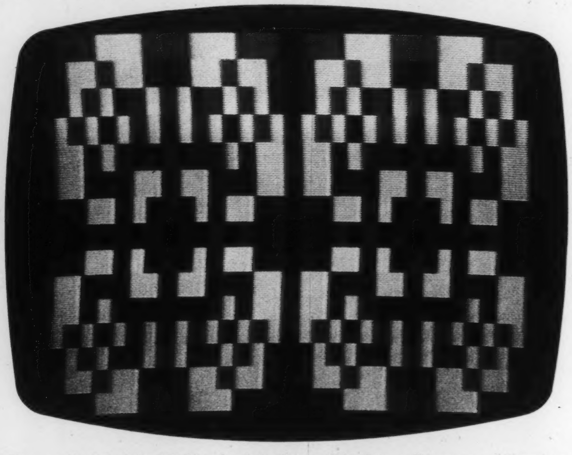


Figure 9. Mod 9: (0)black, (1)white, (2)white, (3)green, (4)green, (5)green, (6)green, (7)white, (8)white.

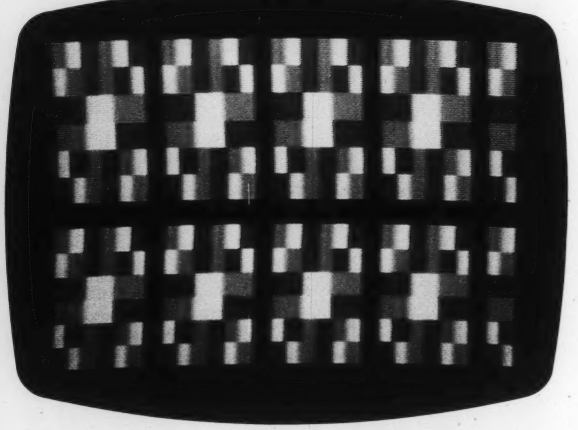
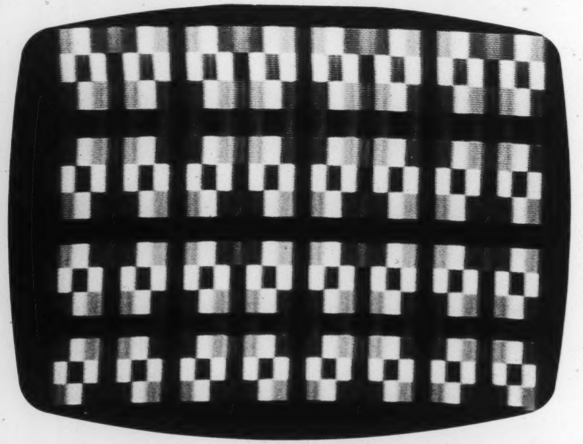


Figure 10. Mod 7: (0)black, (1)green, (2)yellow, (3)blue, (4)green, (5)yellow, (7)blue.



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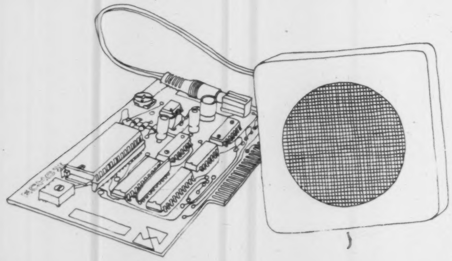

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CIRCLE 256 ON READER SERVICE CARD

Modular Arithmetic, continued...

About the Pictures

The black and white figures were made by dumping the design to a printer using the 16 levels of gray possible with a Pkaso interface. The colors represented by the dot densities are listed along with the numbers they replace. These designs were made using only two colors, one for odd remainders and one for even remainders.

Figures 5 through 10 are color pnotos of the monitor display for which patterns were made by grouping the colors in common multiples of the mod. Again the colors are listed along with the numbers they replace. About the only method that won't produce patterns is using a different color for each remainder. Experimentation leads to some interesting results.

Acknowledgment

The authors would like to thank Helene LaBonville for the Color Computer program and photography and Priscilla Walling for the TI 99/4 program. □

Listing 1. Applesoft Basic program for generating mod math art.

```
10  HOME : DIM CLR(20)
20  VTAB 3
30  FOR I = 1 TO 40
40  PRINT "*";
50  NEXT
60  PRINT : PRINT
70  PRINT "              MOD
ARITHMETIC"
80  PRINT
90  PRINT "                   AND"
100  PRINT
110  PRINT "              COMPUTER
ART"
120  PRINT
130  PRINT "                    BY"
140  PRINT
150  PRINT "              DAVID
MEGER"
160  PRINT
170  PRINT "                   AND"
180  PRINT
190  PRINT "             MATTHEW
WALLING"
200  VTAB 21
210  FOR I = 1 TO 40
220  PRINT "*";
230  NEXT I
240  FOR I = 1 TO 2000
250  NEXT I
260  HOME
270  PRINT "DO YOU KNOW WHAT MOD
ART IS? IF YOU DO  THEN FINE. BUT
IF YOU ANSWER NO THEN     WE'LL
TELL YOU. (ANSWER YES OR NO):";
280  INPUT ANS$
290  IF LEFT$(ANS$,1)   "Y" THEN
410
300  HOME : PRINT "MOD ARITHMETIC
IS A CONCEPT WITH WHICH  WE ARE ALL
FAMILIAR. FOR EXAMPLE ,IF IT IS TEN
O'CLOCK,THEN THREE HOURS LATER
ITWILL BE ONE O'CLOCK  (AND NOT, AS
IN    SIMPLE ARITHMETIC, THIRTEEN
O'CLOCK.)";
310  PRINT "   A CLOCK OR WATCH IS
AN EXAMPLE OF WHAT  IS KNOWN AS A
MODULAR12  SYSTEM.  THE 12MEANS
THAT THERE ARE ONLY 12
NUMBERS...1THROUGH 12.";
320  PRINT "   IN ORDINARY
ARITHMETIC,   THERE IS AN INFINITE
NUMBER OF INTEGERS.TO DO MOD
ARITHMETIC SOLVE THE PROBLEM,
DIVIDE THE ANSWER WITH THE MOD THEN
PUT DOWN THE REMAINDER."
330  PRINT
340  PRINT "TO SHOW THAT YOU
UNDERSTAND MODULAR      ARITHMETIC
GIVE THE ANSWER TO THE FOLLOWING
PROBLEM USING MOD 4."
350  VTAB 20:CALL -868: PRINT "6 +
4 =";
360  INPUT ANS
370  IF ANS <  > 2 THEN  HTAB 20:
VTAB 20: PRINT "WRONG TRY AGAIN":
GOTO 350
380  VTAB 20: HTAB 20: PRINT "GOOD
JOB!!!!"
390  FOR M = 1 TO 2000
400  NEXT M
410  HOME : PRINT
420  PRINT "TO GET MOD ART YOU MUST
COLOR EACH      ANSWER OR GROUP OF
ANSWERS A DIFFERENT  COLOR."
430  PRINT
440  INPUT "WHAT MOD WOULD YOU LIKE
TO WORK WITH?   (1-18): ";MOD
450  IF MOD < 1 OR MOD > 18 THEN
440
460  HOME
470  FOR ROW = 0 TO MOD
480  FOR COL = 0 TO MOD
490 ANS = COL * ROW
500 R =  INT ((ANS / MOD -  INT
(ANS / MOD)) * MOD + .5)
510  IF R < 10 THEN  PRINT " ";
520  PRINT R;
530  NEXT COL
540  PRINT
550  NEXT ROW
560  PRINT
570  PRINT " SINGLE PATTERN BLOCK"
580  VTAB 23
590  PRINT "        MULTIPLICATION
MOD ";MOD
600  GET KEY$
610  HOME
620  PRINT "ENTER THE COLORS THAT
YOU WANT FROM THE TABLE BELOW"
630  PRINT : PRINT
640  PRINT "0 BLACK"; TAB( 20);"8
BROWN"
650  PRINT "1 MAGENTA"; TAB( 20);"9
ORANGE"
660  PRINT "2 DARK BLUE"; TAB(
20)"10 BLUE GREY"
```

```
670  PRINT "3 PURPLE"; TAB( 20);"11
PINK"
680  PRINT "4 DARK GREEN"; TAB(
20);"12 GREEN"
690  PRINT "5 GREY"; TAB( 20);"13
YELLOW"
700  PRINT "6 MEDIUM BLUE"; TAB(
20);"14 AQUA"
710  PRINT "7 LIGHT BLUE"; TAB(
20);"15 WHITE"
720  PRINT : PRINT
730  FOR I = 0 TO MOD - 1
740  VTAB 18:CALL -868: PRINT
"COLOR FOR NUMBER ";I;
750  INPUT CLR(I)
760  IF CLR(I) < 0 OR CLR(I) > 15
THEN 740
770  NEXT I
780  HOME
790  GR
800  FOR ROW = 0 TO 39
810  FOR COL = 0 TO 39
820 ANS = ROW * COL
830 R =  INT ((ANS / MOD -  INT
(ANS / MOD)) * MOD + .5)
840  COLOR= CLR(R)
850  PLOT COL,ROW
860  NEXT COL
870  NEXT ROW
880  VTAB 23: PRINT "
MULTIPLICATION MOD ";MOD
890  GET KEY$
900  TEXT : HOME
910  GOTO 440
```

*Listing 2. Compressed TRS-80 Color Computer (16K) version. Plotting of colors is achieved via PRINT a (ROW*32 + COL), CHR$ (color code).*

```
1 ' MOD ARITHMETIC AND COMPUTER ART
6 ' TRS-80C VERSION BY HM
LABONVILLE
10 CLS: DIM CLR(15)
420 PRINT "TO GET 'MOD ART' YOU
MUST COLOR EACH ANSWER OR GROUP OF
ANSWERS A DIFFERENT COLOR."
430 PRINT
440 INPUT "WHAT MOD WOULD YOU LIKE
TO WORK WITH (1-15): ";MOD
450 IF MOD<1 OR MOD>15 THEN 440
620 PRINT "ENTER THE COLORS THAT
YOU WANT  FROM THE TABLE BELOW:"
630 PRINT
640 PRINT TAB(5) "<0> BLACK    ";
CHR$(128)
650 PRINT TAB(5) "<1> GREEN"
660 PRINT TAB(5) "<2> YELLOW
";CHR$(159)
670 PRINT TAB(5) "<3> BLUE     ";
CHR$(175)
680 PRINT TAB(5) "<4> RED      ";
CHR$(191)
690 PRINT TAB(5) "<5> BUFF     ";
CHR$(207)
700 PRINT TAB(5) "<6> CYAN     ";
CHR$(223)
710 PRINT TAB(5) "<7> MAGENTA ";
CHR$(239)
720 PRINT TAB(5) "<8> ORANGE  ";
CHR$(255)
730 FOR I=0 TO MOD-1
740 PRINT @448, "COLOR FOR NUMBER
"; I;
750 INPUT CLR(I)
760 IF CLR(I)<0 OR CLR(I)>8 THEN
740
770 NEXT I
780 CLS(0)
800 FOR ROW =0 TO 14
810 FOR COL =0 TO 31
820 ANS = ROW * COL
830 R=
INT(ANS/MOD-INT(ANS/MOD))*MOD +.5)
840 CLOR=CLR(R)
850 IF CLOR<>0 THEN
MDW$=CHR$(127+16*CLOR)ELSE
MDW$=CHR$(128)
855 PRINT @(ROW*32+COL), MDW$;
860 NEXT COL
870 NEXT ROW
880 PRINT @481, "THIS IS
MULTIPLICATION MOD ";MOD;
890 HM$=INKEY$: IF HM$ =" " THEN
890
900 CLS
910 GO TO 440
```

Listing 3. TI 99/4 Basic program for generating mod math art. Character block can take on any shape.

```
1 REM MOD ARITHMETIC AND COMPUTER
ART
5 REM TI99/4 VERSION BY P. WALLING
10 DIM
CLS(20),CRS(20),A$(20),BKG(20),FRG(
20)

15 CALL CLEAR
25 CODE=32
440 INPUT "WHAT MOD WOULD YOU LIKE
TO TRY(1-12)?: ":MOD
445 IF MOD <1 THEN 440
447 IF MOD >12 THEN 440
620 PRINT "ENTER THE COLORS THAT
YOU WANT FORM THE TABLE BELOW:"
630 PRINT
640 PRINT "1
TRANSPARENT";TAB(15);"9 MEDIUM RED"
```

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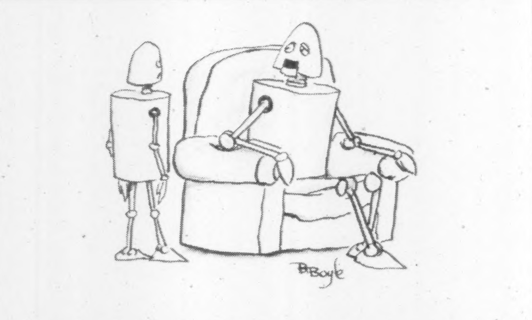
Modular Arithmetic, continued...

```
650 PRINT "2 BLACK";TAB(15);"10
LIGHT RED"

660 PRINT "3 MEDIUM
GREEN";TAB(15);"11 DARK YELLOW"
670 PRINT "4 LIGHT
GREEN";TAB(15);"12 LIGHT YELLOW"
680 PRINT "5 DARK BLUE";TAB(15);"13
DARK GREEN"
690 PRINT "6 LIGHT
BLUE";TAB(15);"14 MAGENTA"
700 PRINT "7 DARK RED";TAB(15);"15
GREY"
710 PRINT "8 CYAN";TAB(15);"16
WHITE"
720 PRINT::
730 FOR I=0 TO MOD-1
735 CLS(I)=I+2
736 CODE=CODE+8
737 CRS(I)=CODE
740 PRINT "CHARACTER CODE: ";I;
742 INPUT A$(I)
745 PRINT "BACKGROUND COLOR: ";I;
746 INPUT BKG(I)
748 PRINT "FOREGROUND COLOR: ";I;
749 INPUT FRG(I)
770 NEXT I
780 CALL CLEAR
785 CALL SCREEN(16)
800 FOR ROW=1 TO 24
810 FOR COL=1 TO 32
820 ANS=ROW*COL
830
R=INT((ANS/MOD-INT(ANS/MOD))*MOD+.5
)
840 CALL HCHAR(ROW,COL,CRS(R))
845 CALL CHAR(CRS(R),A$(R))
848 CALL
COLOR(CLS(R),FRG(R),BKG(R))
860 NEXT COL
870 NEXT ROW
910 GO TO 910
```



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The Serial Code Keyboard helps the severely handicapped communicate

Communicating In Code

Wolfger Schneider

Data and command entry to computers via a typical keyboard is a relatively easy task for those of us who have no physical handicaps. But consider the plight of the upper limb amputee trying to type shift or control keys using the traditional mouthstick. Or how about a quadriplegic just trying to move any key with remnant head motion or vestigial finger or toe motion. Many of these individuals are currently denied access to computers because of the lack of a suitable data entry technique.

The Serial Code Keyboard under development at the Applied Physics Laboratory of the Johns Hopkins University for the Veterans Administration is a low-cost, reliable, and relatively easy method of data entry. It requires only the capability to move a spring-centered three-position switch to either extreme position.

These two extreme positions are sensed as simple switch closures and stimulate the generation of two easily distinguishable tone sequences. Modulation of these tone sequences by appropriate movement of the switch can be used to generate an easily learned pseudo Morse Code. These serial tone encoded sequences can then be translated to corresponding ASCII codes to duplicate the function of the standard keyboard.

Assuming the availability of an appropriate three-position switch, the Serial Code Keyboard functions can be implemented in either a separate firmware module (Figure 1) that logically ORs the standard keyboard produced ASCII with the Serial Code Keyboard produced ASCII or they could be implemented in appropriately linked software executing on a personal computer.

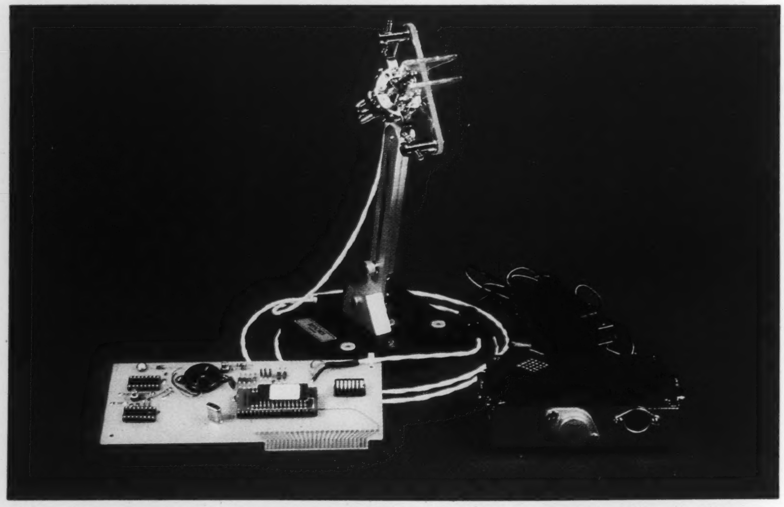

Figure 1. The center device is a Morse keyer mounted to be operated with up and down chin motion. It will drive both of the firmware implementations of the Serial Code Keyboard shown. The unit on the left is an Apple specific card which will operate from any I/O slot and sits electrically between the keyboard and the CPU board. The unit in the right is designed to operate with any dumb RS-232 type terminal.

The firmware approach is advantageous for proprietary software packages that allow no linking with other software. The software approach for the Apple Computer described in this article provides a good familiarization with the Serial Code Keyboard approach to data entry and can be successfully used with most Applesoft programs.

The Electro-Mechanical Interface

To exercise the Serial Code Keyboard software, a three-position switch arrangement suitable to the individual handicap must be constructed. It is important to arrive at a switch-lever arrangement that takes into account the handicapped user's stroke length, stroke trajectory, stroke force levels, and stroke positioning accuracy capabilities. In some situations, a standard Morse keyer suitably mounted, may serve as an appropriate three-position switch (Figure 1).

Electrically, the two switch contacts are interfaced to the Apple computer via the game port as shown in Figure 2 using the same bit inputs used by the game paddle pushbuttons. This electrical connection is of opposite polarity to that used by the pushbuttons on the game paddles. The switch connected to PB0 will produce a sequence of high frequency "dits" for as long as the switch is

---

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closed. Similarly, PB1 will produce a sequence of low frequency "dahs".

Operation Of The Serial Code Keyboard

To type a character with the Serial Code Keyboard, the user must move the switch so as to generate the tone sequence corresponding to the desired character. For example, **-- will generate the letter Z, when * is used to represent the higher tone (dit) and - to represent the lower tone (dah). A key position-tone correspondence time diagram is shown in Figure 3.

It should be noted that dit and dah sounds are of equal duration and that the sound-on time equals the sound-off time. This departs from the traditional Morse Code which does not frequency encode dits and dahs and requires dahs to last three times as long as dits. Since we are not using time duration modulation, it is more efficient to make dits and dahs of equal duration. The end of character is recognized by no transmission for a time equal to more than two dah durations.

The serial code correspondence with printable, nonprintable, and mode keys are shown in Table 1. For historic reasons and for code efficiency reasons, the International Morse Code definitions for alphabetic, numeric, and punctuation keys were retained. New definitions had to be made for the space, backspace, linefeed, escape, and enter keys.

In addition to the standard keyboard mode, four keyboard modes are defined by first generating the serial code for the desired mode followed by the alphabetic or numeric modifier.

The shift mode allows the shift codes to be generated and the control mode allows the control codes to be generated.

The repeat mode repeatedly generates at a reasonable rate the code for the selected character until either switch is momentarily closed. A short high frequency tone indicates termination of the repeat mode.

The sequence mode allows predefined ASCII code sequences to be called up. For example, sequence-C generates code for CATALOG-(RETURN) to list the catalog of disk files.

Serial codes not defined in any of the keyboard modes are identified by a short high frequency tone being issued and no code being generated.

Continuous backspacing occurs when generating more than seven dahs, after which every new dah results in a backspace. Similarly, continuous "retype" occurs when more then seven dits are generated. Cursor movement can be done by using escape I, J, K, or M just as with the regular keyboard but is better defined as a repeating sequence.

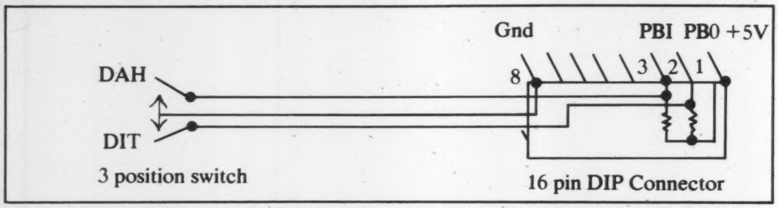

Figure 2. Electrical connection of the three-position switch is easily achieved via the Apple game I/O socket. A 16-pin DIP connector should be hooked up as shown.

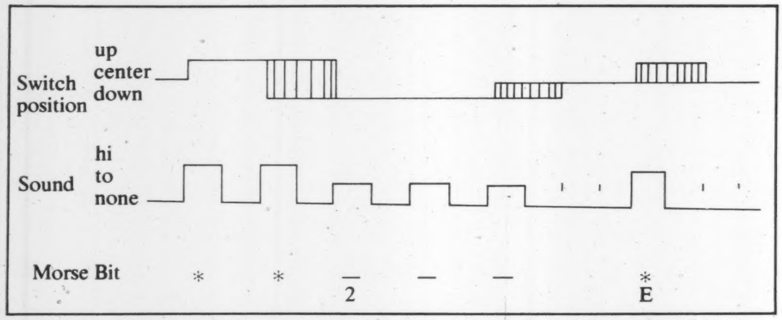

Figure 3. A switch position-sound correspondence timing diagram shows what sounds are produced by a certain switch motion and how the sounds generate Morse code. Note that precise timing of the sound intervals is not required of the operator and that reasonable timing uncertainties are allowable between the start of a high or low tone and its opposite.

A *-	N -*	1 *----	SPACE	**--
B -***	O ---	2 **---	BACK	----
C -*-*	P *--*	3 ***--	LINE	*-*-
D -**	Q --*-	4 ****-	ENTER	---*
E *	R *-*	5 *****		
F **-*	S ***	6 -****	SHIFT	------
G --*	T -	7 --***	CTRL	******
H ****	U **-	8 ---**	REPT	----**
I **	V ***-	9 ----*	SEQ	***---
J *---	W *--	0 -----	ESC	**----
K -*-	X -**-			
L *-**	Y -*--	: ---***	, --**--	
M --	Z --**	; -*-*-*	. *-*-*-	
		- *****-	/ ****--	

Table 1 This Morse code table taken from the Morse tutor program shows the code assignments for alphanumeric and punctuation keys, special code assignments for cursor control and mode control keys were made as shown. Punctuation and graphic keys requiring the shift key on the standard keyboard will require the shift mode code to precede the code of the desired key that shares its location.

Software

The software provided in this article to present the Serial Code Keyboard concept, consists of three files.

The Hello file loads and links the binary machine code file which implements the Serial Code Keyboard functions. It also modifies the machine code to allow operation with the pushbuttons on the game paddles (line 200) for immediate trial use. The option of Morse Code tutorial is also provided.

The tutorial file is an Applesoft program which briefly explains how to drive the Serial Code Keyboard software. It also offers speed selection for code practice and provides a split screen for practicing the code. The upper part of the screen displays lowercase and mode code correspondences. The lower part of the screen is a scrolling screen which shows the characters being generated.

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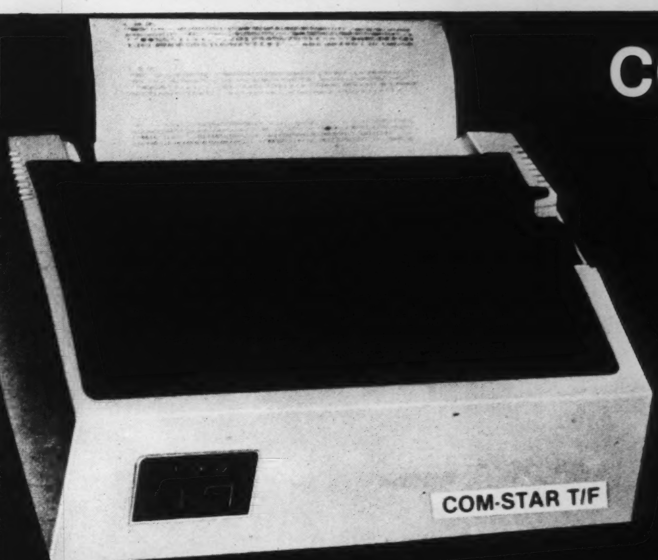

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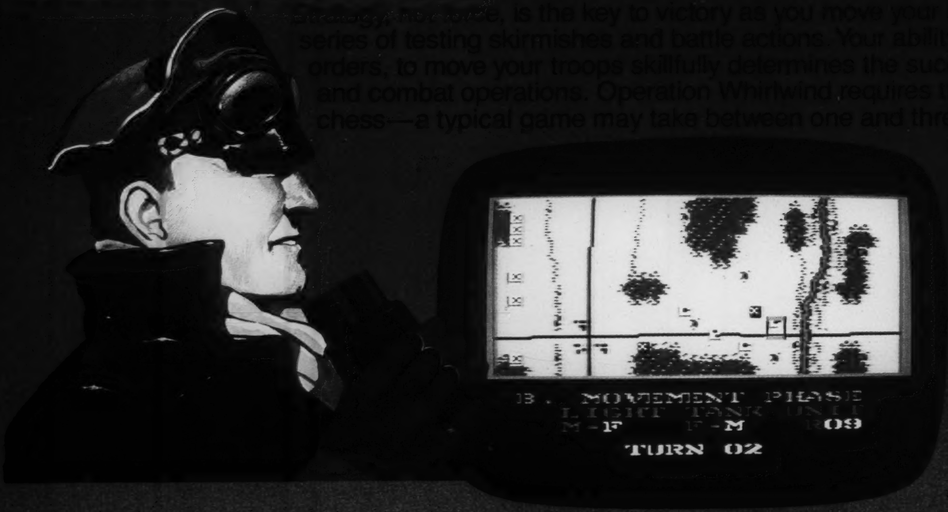

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Serial Code Keyboard, continued...

An exit from the tutorial to the interpreter is provided so that some of the predefined sequences can be executed.

The binary machine code file assumes a 48K Apple and is loaded below the DOS starting at location $9200. The code is linked with DOS and becomes the input device until disconnected, by a reset for example. HIMEM has been reset to protect the machine code during Applesoft program generation.

A few predefined sequences exist to help the user and to illustrate the sequence mode:

G to greet your guests
H to run the Hello file
M to exit to the monitor
C to present the files in the catalog
S to clear the whole screen
B to sound the alarm
U to move the cursor up repeatedly
D to move the cursor down repeatedly
L to move the cursor left repeatedly
R to move the cursor right repeatedly

Summary

The Serial Code Keyboard is presented here to provide potential users with the opportunity of trying it out to see if it provides a reasonable approach of data and command entry. Firmware implementations of the Serial Code Keyboard have been developed for the Apple computer and for "dumb" RS-232-type terminals by the Applied Physics Laboratory of the Johns Hopkins University. These units are currently being evaluated in several rehabilitation centers throughout the United States and Canada. If these evaluations are positive, the units may soon be in commercial production. ☐

Listing 1.

```
************************
* SERIAL CODE KEYBOARD *
*       HELLO          *
*         BY           *
*   WOLFGER SCHNEIDER  *
************************

10  HOME
20  VTAB 2
30  PRINT "THE SERIAL CODE KEYBOARD WILL ALLOW"
40  PRINT "A MORSE-TYPE PADDLE INTERFACED TO THE"
50  PRINT "GAME PADDLE INPUTS TO SERVE AS A"
60  PRINT "SECOND KEYBOARD FOR HANDICAPPED USE."
70  PRINT "THIS PROGRAM WILL BE ERASED BY THE"
80  PRINT "EXECUTION OF SOME SOFTWARE PACKAGES."
90  PRINT "IT IS THEREFORE BEST USED AS A TRAINER."
100  PRINT " "
110  PRINT "FOR COMMENTS REGARDING THIS PROGRAM"
120  PRINT "WRITE TO:
130  PRINT "       WOLFGER SCHNEIDER"
140  PRINT "       5148 CELESTIAL WAY"
150  PRINT "       COLUMBIA,MD  21044"
160  VTAB 23
170  PRINT "(THIS SOFTWARE IS IN THE PUBLIC DOMAIN)"
180  PRINT  CHR$ (4),"BLOAD MORSE OBJ"
190  REM  THE FOLLOWING LINE MODIFIES THE CODE TO ALLOW GAME PADDLE USAGE

200  POKE 37495,48: POKE 37500,48: POKE 37502,16: POKE 37571,16: POKE 375
     79,16
210  VTAB 16
220  PRINT "PRESS MORSE KEY TO MAKE SELECTION"
230  PRINT "INDICATED:"
240  VTAB 19
250  PRINT "  DO YOU WISH TO EXIT?"
260  PRINT "  DO YOU WISH THE SERIAL CODE KEYBOARD?"
270  PRINT "  DO YOU WISH THE MORSE TUTOR?"
```

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Serial Code Keyboard, continued...

```
280  GOTO 320
290  HIMEM: 37375
300  HOME : POKE 56,9: POKE 57,146: CALL 1002
310  END
320 I = 0
330  HTAB 1: VTAB (19 + I)
340  INVERSE : PRINT " ";: NORMAL
350 J = 0
360  IF ( PEEK (49249) > 127 OR  PEEK (49250) > 127 OR  PEEK (49152) > 12
    7) GOTO 430
370 J = J + 1
380  IF J < 50 GOTO 360
390  PRINT  CHR$ (8);" ";
400 I = I + 1
410  IF I < 3 GOTO 330
420  GOTO 320
430  ON I + 1 GOTO 480,290,440
440  HIMEM: 37375
450  POKE 56,9: POKE 57,146: CALL 1002
460  PRINT ""
470  PRINT  CHR$ (4);"RUN MORSE TUTOR.P"
480  HOME : END
```

Listing 2.

```
*************************
* SERIAL CODE KEYBOARD *
*      MORSE TUTOR      *
*          BY           *
*   WOLFGER SCHNEIDER   *
*************************

10  GOTO 260
20  HOME
30  POKE 34,18
40  PRINT " "
50  PRINT " A *-     N -*     1 *----  SPACE    **--"
60  PRINT " B -***   O ---    2 **---  BACK     ----"
70  PRINT " C -*-*   P *--*   3 ***--  LINE     *-*-"
80  PRINT " D -**    Q --*-   4 ****-  ENTER    ---*"
90  PRINT " E *      R *-*    5 *****"
100  PRINT " F **-*   S ***    6 -****  SHIFT   ------"
110  PRINT " G --*    T -      7 --***  CTRL    ******"
120  PRINT " H ****   U **-    8 ---**  REPT    ----**"
130  PRINT " I **     V ***-   9 ----*  SEQ     ***---"
140  PRINT " J *---   W *--    0 -----  ESC     **----"
150  PRINT " K -*-    X -**-"
160  PRINT " L *-**   Y -*--   : ---*** , --**--"
170  PRINT " M --     Z --**   ; -*-*-* . *-*-*-"
180  PRINT "                   - *****- / ****--"
190  PRINT " ": PRINT " "
200  PRINT "----------------------------------------"
210  PRINT " % (SHIFT-5)  TERMINATES THE PRACTICE"
220  GET A$: PRINT A$;
230  IF  ASC (A$) = 37 GOTO 250
240  GOTO 220
250  POKE 34,00: HOME : END
260  HOME
270  PRINT "THE SERIAL CODE KEYBOARD DUPLICATES THE"
280  PRINT "REGULAR APPLE KEYBOARD BY TRANSLATING"
290  PRINT "APPROPRIATE MORSE CODES TO CORRESPONDING"
300  VTAB 4
310  PRINT "APPLE KEYBOARD CODES. FOR EXAMPLE:"
320  PRINT "       *-  WILL GENERATE 'A'"
330  PRINT "  * IS THE HIGHER TONE (DIT)"
340  PRINT "  - IS THE LOWER TONE (DAH)"
350  PRINT "THE USER WILL GENERATE DIT SEQUENCES"
360  PRINT "BY PRESSING THE MORSE KEY ONE WAY AND"
370  PRINT "DAH SEQUENCES BY PRESSING THE KEY THE"
380  PRINT "OTHER WAY. THE SOUND ON-TIME EQUALS THE"
390  PRINT "SOUND OFF-TIME. THE USER CAN GENERATE"
400  PRINT "THE APPROPRIATE DIT/DAH SEQUENCES BY"
410  PRINT "LISTENING TO THE TONES AND MOVING"
420  PRINT "THE KEY SO AS TO GENERATE THE DESIRED"
430  PRINT "TONE SEQUENCES. RESTING THE KEY IN THE"
440  PRINT "CENTER POSITION (SOUND OFF) FOR TWO"
450  PRINT "DIT/DAH TIME INTERVALS, SIGNIFIES THE"
460  PRINT "END OF CHARACTER. IF THE MORSE CODE IS"
470  PRINT "VALID, IT WILL BE TRANSLATED AND"
480  PRINT " DISPLAYED, ELSE A SHORT AND HIGH BEEP"
490  PRINT "WILL SOUND."
500  PRINT ""
510  PRINT "    ** FOR MORE, PRESS THE MORSE KEY **";
520  IF ( PEEK (49249) > 127 OR  PEEK (49250) > 127 OR  PEEK (49152) > 12
    7) GOTO 540
530  GOTO 520
540  POKE 49168,0: HOME : VTAB (2)
550  PRINT "* SHIFTED CHARACTERS ARE DISPLAYED BY"
560  PRINT "  FIRST ENTERING THE SHIFT MODE,
570  PRINT "  (------) FOLLOWED BY THE LOWER CASE"
580  PRINT "  CHARACTER.  FOR EXAMPLE, SHIFT-1"
590  PRINT "  WILL DISPLAY '!', AFTER WHICH NORMAL"
600  PRINT "  MODE IS REENTERED."
610  PRINT "* CONTROL CHARACTERS ARE DISPLAYED BY"
```

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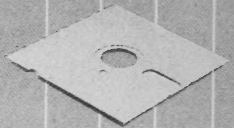

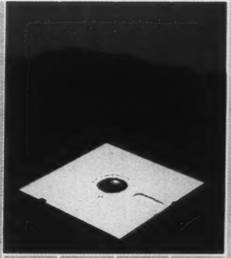

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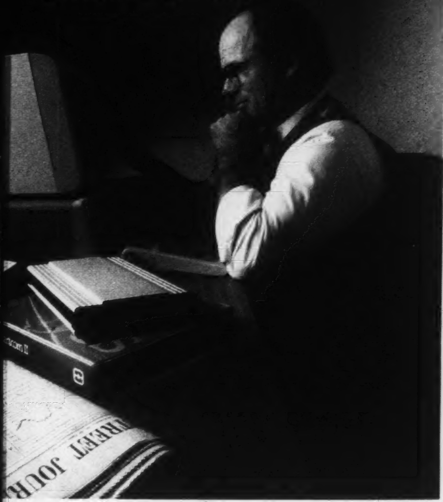

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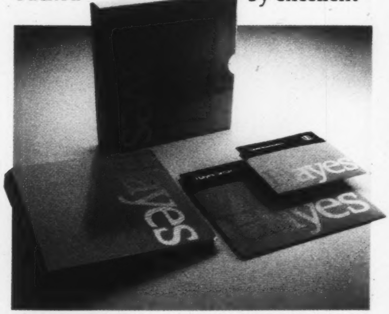

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CIRCLE 172 ON READER SERVICE CARD

Serial Code Keyboard, continued...

```
620  PRINT "  FIRST ENTERING THE CONTROL MODE,"
630  PRINT "  (******) FOLLOWED BY THE LOWER CASE"
640  PRINT "  CHARACTER. FOR EXAMPLE, CNTL-G WILL"
650  PRINT "  SOUND THE BELL, AFTER WHICH NORMAL"
660  PRINT "  MODE IS REENTERED."
670  PRINT "* PRE-STORED SEQUENCES CAN BE DISPLAYED"
680  PRINT "  BY FIRST ENTERING SEQUENCE MODE,"
690  PRINT "  (***---) FOLLOWED BY A CORRESPONDING"
700  PRINT "  LOWER CASE CHARACTER. FOR EXAMPLE,"
710  PRINT "  SEQ-G WILL GREET YOUR GUESTS, AFTER"
720  PRINT "  WHICH NORMAL MODE IS REENTERED."
730  PRINT "": PRINT ""
740  PRINT "    ** FOR MORE, PRESS THE MORSE KEY **";
750  IF ( PEEK (49249) > 127 OR  PEEK (49250) > 127 OR  PEEK (49152) > 12
     7) GOTO 770
760  GOTO 750
770  POKE 49168,0: HOME : VTAB (2)
780  PRINT "* CONTINUOUS CURSOR MOVEMENT TO THE "
790  PRINT "  LEFT AND RIGHT IS ACHIEVED BY GENE-"
800  PRINT "  RATING MORE THAN 7 CONSECUTIVE DIT OR"
810  PRINT "  DAH SEQUENCES RESPECTIVELY.": VTAB 10
820  PRINT "SELECT A PRACTICE SPEED BY PRESSING"
830  PRINT "THE MORSE KEY WHEN THE DESIRED SPEED"
840  PRINT "IS FLASHING."
850  PRINT ""
860  PRINT "          VERY FAST"
870  PRINT "          FAST"
880  PRINT "          MEDIUM"
890  PRINT "          SLOW"
900 I = 0
910  HTAB 9: VTAB (14 + I)
920  INVERSE : PRINT " ";: NORMAL
930 J = 0
940  IF ( PEEK (49249) > 127 OR  PEEK (49250) > 127 OR  PEEK (49152) > 12
     7) GOTO 1010
950 J = J + 1
960  IF J < 30 GOTO 940
970  PRINT  CHR$ (8);" ";
980 I = I + 1
990  IF I < 4 GOTO 910
1000  GOTO 900
1010  POKE 37376,I + 3
1020  POKE 49168,0
1030  VTAB 24
1040  HTAB (1)
1050  PRINT "**TO PRACTICE CODE PRESS THE MORSE KEY**";
1060  IF ( PEEK (49249) > 127 OR  PEEK (49250) > 127 OR  PEEK (49152) > 1
     27) GOTO 20
1070  GOTO 1060
```

Listing 3.

```
SOURCE FILE: MORSE.SRC
0000:             1 ***************************************************************
0000:             2 * SERIAL CODE KEYBOARD BY  WOLFGER SCHNEIDER MAY.1982
0000:             3 ***************************************************************
0000:             4 *
0000:             5 *EQUATES
C061:             6 DITLINE EQU  $C061
C062:             7 DAHLINE EQU  $C062
C030:             8 SOUND   EQU  $C030
0778:             9 ICHAR   EQU  $0778
FD26:            10 GETKEY  EQU  $FD26
0028:            11 BASL    EQU  $28
004E:            12 RNDL    EQU  $4E
004F:            13 RNDH    EQU  $4F
C000:            14 KBD     EQU  $C000
0080:            15 TONE    EQU  $80
00FE:            16 PTR     EQU  $FE
----- NEXT OBJECT FILE NAME IS MORSE.OBJ
9200:            17         ORG  $9200
9200:            18 *VARIABLES
9200:04          19 ELEMTIM DFB  04
9201:00          20 EDITFLG DFB  0
9202:00          21 REPEATF DFB  0
9203:00          22 CNTLFLG DFB  0
9204:00          23 SHFLAG  DFB  0
9205:00          24 SEQFLAG DFB  0
9206:02          25 TCOUNT  DFB  2
9207:01          26 CHWORD  DFB  1
9208:00          27 SEQOFLG DFB  0
9209:            28 *
9209:2C 87 93    29 NITNTRY BIT  IORTS       V=1 TO MARK INIT ENTRY
920C:70 01       30         BVS  SAVREGS
920E:B8          31 NRMNTRY CLV              V=0 TO MARK REG ENTRY
920F:48          32 SAVREGS PHA              SAVE REGS A,X,Y ON STACK
9210:98          33         TYA
9211:48          34         PHA
9212:8A          35         TXA
9213:48          36         PHA
9214:50 1D       37         BVC  SEQCHK
9216:A9 0E       38         LDA  #$0E        WRITE KSWL TO BYPASS NITNTRY
9218:85 38       39         STA  $38
```

WELCOME TO APSHAI.
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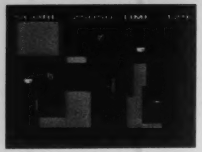

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Gateway to Apshai

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*Game Manufacturers Association, 1981

CIRCLE 159 ON READER SERVICE CARD

Serial Code Keyboard, continued...

```
921A:A9 00              LDA  #0         CLEAR FLAGS
921C:8D 01 92           STA  EDITFLG
921F:8D 02 92           STA  REPEATF
9222:8D 05 92           STA  SEQFLAG
9225:8D 08 92           STA  SEQOFLG
9228:A9 00      BEEPNIT LDA  #0
922A:8D 03 92           STA  CNTLFLG
922D:8D 04 92           STA  SHFLAG
9230:20 29 94           JSR  BEEP
9233:2C 08 92   SEQCHK  BIT  SEQOFLG    IF SEQUENCE OUT
9236:10 37              BPL  RPTCHK     REQUESTED,
9238:A0 00              LDY  #0         FETCH CHARACTER IN STRING
923A:B1 FE      SCHGET  LDA  (PTR),Y
923C:F0 17              BEQ  SEQEND     IF NULL, DONE
923E:8D 07 92           STA  CHWORD     SAVE CHARACTER
9241:E6 FE              INC  PTR        (WON'T WORK ACROSS BOUNDARIES)
9243:C9 FF              CMP  #$FF       IF CHARACTER<>FF,
9245:F0 18              BEQ  SEQRPT
9247:A0 20              LDY  #$20       DELAY
9249:A2 20              LDX  #$20
924B:18                 CLC
924C:20 32 94           JSR  TIMER
924F:AD 07 92           LDA  CHWORD     RESTORE CHARACTER
9252:4C 72 93           JMP  OUTCHS     ELSE OUTPUT CHARACTER
9255:A9 00      SEQEND  LDA  #0         SEQFLAG=SEQOFLG=0
9257:8D 05 92           STA  SEQFLAG
925A:8D 08 92           STA  SEQOFLG
925D:F0 48              BEQ  MORSINO
925F:A9 00      SEQRPT  LDA  #0         IF CHARACTER=FF
9261:8D 08 92           STA  SEQOFLG    SEQOFLG=0
9264:8D 05 92           STA  SEQFLAG    SEQFLAG=0
9267:CE 02 92           DEC  REPEATF    REPEATF=-1
926A:B1 FE              LDA  (PTR),Y    GET REPEAT CHARACTER
926C:8D 07 92           STA  CHWORD     AND SAVE
926F:           *
926F:2C 02 92   RPTCHK  BIT  REPEATF    IF REPEAT FLAG=0
9272:10 2C              BPL  EDFCHK     CHECK FOR EDITFLG
9274:2C 61 C0           BIT  DITLINE    ELSE,IF KEY NOT DEPRESSED,
9277:10 07              BPL  RPTEND
9279:2C 62 C0           BIT  DAHLINE
927C:10 02              BPL  RPTEND
927E:30 12              BMI  RPT        REPEAT CHARACTER
9280:20 29 94   RPTEND  JSR  BEEP       ELSE,BEEP
9283:A0 20              LDY  #$20       AND DELAY TO AVOID BOUNCE
9285:A2 10              LDX  #$10
9287:18                 CLC
9288:20 32 94           JSR  TIMER
928B:A9 00              LDA  #0
928D:8D 02 92           STA  REPEATF    REPEAT FLAG=0
9290:F0 15              BEQ  MORSINO
9292:A0 20      RPT     LDY  #$20       DELAY REPEAT RATE
9294:A2 20              LDX  #$20
9296:18                 CLC
9297:20 32 94           JSR  TIMER
929A:AD 07 92           LDA  CHWORD     AND REPEAT CHARACTER
929D:4C 72 93           JMP  OUTCHS
92A0:           *
92A0:2C 01 92   EDFCHK  BIT  EDITFLG    IF EDITFLAG NOT ZERO,
92A3:10 02              BPL  MORSINO
92A5:30 0A              BMI  POLLOOP    AND LOOK FOR NEXT LINE LO
92A7:           *
92A7:A9 01      MORSINO LDA  #01        CHWORD=1
92A9:8D 07 92           STA  CHWORD
92AC:A9 02              LDA  #02        INITIALIZE TCOUNT
92AE:8D 06 92           STA  TCOUNT
92B1:           *
92B1:E6 4E      POLLOOP INC  RNDL       KEEP RND NOS GOING
92B3:D0 02              BNE  NN1
92B5:E6 4F              INC  RNDH
92B7:AD 00 C0   NN1     LDA  KBD        CHECK KBD FOR ENTRY
92BA:10 04              BPL  NN2
92BC:18                 CLC             MARK KEYBOARD SOURCE
92BD:4C 78 93           JMP  RESTREG    ...IF SO, ELSE..
92C0:2C 61 C0   NN2     BIT  DITLINE    IF DIT LINE LO,
92C3:30 03              BMI  EOCA
92C5:4C BB 93           JMP  DIT        DO DIT
92C8:2C 62 C0   EOCA    BIT  DAHLINE    IF DAH LINE LO,
92CB:30 03              BMI  EOC
92CD:4C E2 93           JMP  DAH        DO DAH
92D0:           *
92D0:2C 01 92   EOC     BIT  EDITFLG    IF EDITFLG=-1
92D3:10 07              BPL  EOC1
92D5:A9 00              LDA  #0         CLEAR EDITFLAG
92D7:8D 01 92           STA  EDITFLG
92DA:F0 CB              BEQ  MORSINO
92DC:AC 00 92   EOC1    LDY  ELEMTIM
92DF:A2 80              LDX  #TONE      PAUSE ONE ELEMENT TIME
92E1:18                 CLC
92E2:20 32 94           JSR  TIMER
92E5:CE 06 92           DEC  TCOUNT     DECREMENT TCOUNT
92E8:D0 C7              BNE  POLLOOP    AND LOOK FOR NEXT LINE LO
92EA:           *
92EA:AD 07 92           LDA  CHWORD     IF CHWORD STILL =1,I.E. NO CHANGE,
92ED:C9 01              CMP  #01
```

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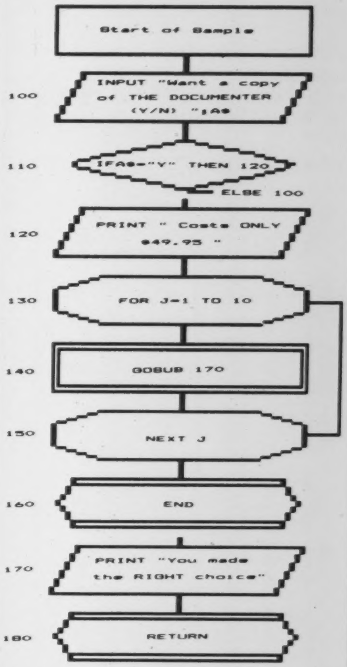
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100
INPUT "Want a copy of THE DOCUMENTER (Y/N) ";A$
110
IFA$="Y" THEN 120
ELSE 100
120
PRINT " Costs ONLY $49.95 "
130
FOR J=1 TO 10
140
GOSUB 170
150
NEXT J
160
END
170
PRINT "You made the RIGHT choice"
180
RETURN

```
BRANCH FROM    FUNCTION    BRANCH TO
-----------    --------    ---------
00110          THEN        00120
00110          ELSE        00100
00140          GOSUB       00170
```

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CIRCLE 138 ON READER SERVICE CARD

Serial Code Keyboard, continued...

```
92EF:F0 C0                BEQ  POLLOOP    LOOK FOR NEXT LINE LO
92F1:            *
92F1:C9 7F                CMP  #$7F       IF"------"
92F3:D0 06                BNE  EOC3
92F5:CE 04 92             DEC  SHFLAG     SHFLAG=-1
92F8:4C A7 92             JMP  MORSINO
92FB:            *
92FB:C9 40       EOC3     CMP  #$40       IF"******"
92FD:D0 06                BNE  EOC4
92FF:CE 03 92             DEC  CNTLFLG    CNTLFLG=-1
9302:4C A7 92             JMP  MORSINO
9305:            *
9305:C9 7C       EOC4     CMP  #$7C       IF"----**"
9307:D0 06                BNE  EOC5
9309:CE 02 92             DEC  REPEATF    REPEATF=-1
930C:4C A7 92             JMP  MORSINO
930F:            *
930F:C9 47       EOC5     CMP  #$47       IF"***---"
9311:D0 06                BNE  EOC6
9313:CE 05 92             DEC  SEQFLAG    SEQFLAG=-1
9316:4C A7 92             JMP  MORSINO
9319:            *
9319:2C 05 92    EOC6     BIT  SEQFLAG    IF SEQFLAG=-1
931C:10 03                BPL  EOC7
931E:4C 88 93             JMP  SEQUENC    DO SEQUENC
9321:            *
9321:2C 04 92    EOC7     BIT  SHFLAG     IF SHFLAG=-1
9324:10 13                BPL  EOC8
9326:AE 25 95             LDX  SHFTPTR    LOOK FOR VALID CODE
9329:86 FE                STX  PTR        IN SHIFTABLE
932B:AE 26 95             LDX  SHFTPTR+1
932E:86 FF                STX  PTR+1
9330:AA                   TAX
9331:A9 00                LDA  #0         SHFLAG=0
9333:8D 04 92             STA  SHFLAG
9336:4C 5C 93             JMP  FIND
9339:            *
9339:2C 03 92    EOC8     BIT  CNTLFLG    IF CNTLFLG=-1
933C:10 13                BPL  EOC9
933E:AE E9 94             LDX  CNTLPTR    LOOK FOR VALID CODE
9341:86 FE                STX  PTR        IN CNTLTBL
9343:AE EA 94             LDX  CNTLPTR+1
9346:86 FF                STX  PTR+1
9348:AA                   TAX
9349:A9 00                LDA  #0         CNTLFLG=0
934B:8D 03 92             STA  CNTLFLG
934E:4C 5C 93             JMP  FIND
9351:            *
9351:AE B2 94    EOC9     LDX  NRMLPTR    ELSE,LOOK FOR VALID CODE
9354:86 FE                STX  PTR        IN NRMLTBLE
9356:AE B3 94             LDX  NRMLPTR+1
9359:86 FF                STX  PTR+1
935B:AA                   TAX
935C:            *
935C:A0 00       FIND     LDY  #0         CLEAR INDEX
935E:8A          FINDLP   TXA             COMPARE TABLE ENTRY
935F:D1 FE                CMP  (PTR),Y
9361:F0 09                BEQ  FOUND
9363:C8                   INY             IF NOT FOUND, GOTO NEXT MORSE ENTRY
9364:C8                   INY
9365:B1 FE                LDA  (PTR),Y    AND CHECK FOR END OF TABLE
9367:D0 F5                BNE  FINDLP
9369:4C 28 92             JMP  BEEPNIT    ...IF NOT FOUND
936C:C8          FOUND    INY             ELSE GET CORRESPONDING ASCII CODE
936D:B1 FE                LDA  (PTR),Y    SAVE AND OUTPUT
936F:8D 07 92             STA  CHWORD
9372:38          OUTCHS   SEC             MARK MORSE SOURCE
9373:09 80                ORA  #$80       FORCE MSB=1 FOR APPLE
9375:8D 78 07             STA  ICHAR      AND SAVE
9378:68          RESTREG  PLA             RESTORE REGISTERS
9379:AA                   TAX
937A:68                   PLA
937B:A8                   TAY
937C:68                   PLA
937D:B0 03                BCS  RR1
937F:4C 26 FD             JMP  GETKEY     KEYBOARD RETURN
9382:91 28       RR1      STA  (BASL),Y   MORSE RETURN
9384:AD 78 07             LDA  ICHAR
9387:60          IORTS    RTS             RETURN TO MONITOR
9388:            *
9388:AE 27 95    SEQUENC  LDX  SEQPTR     SET-UP SEQUENC
938B:86 FE                STX  PTR
938D:AE 28 95             LDX  SEQPTR+1
9390:86 FF                STX  PTR+1
9392:AA                   TAX
9393:A0 00                LDY  #0
9395:8A          SEQFLP   TXA             SEARCH FOR VALID
9396:D1 FE                CMP  (PTR),Y    MORSE CHARACTER
9398:F0 0F                BEQ  OKSEQ
939A:C8                   INY             SKIP STRING POINTER
939B:C8                   INY
939C:C8                   INY
939D:B1 FE                LDA  (PTR),Y    IF AT END OF SEARCH,
939F:D0 F4                BNE  SEQFLP     EXIT
```

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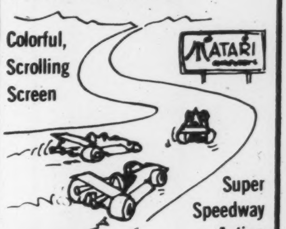

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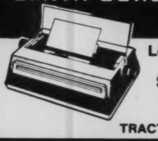

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93A1:A9 00              LDA  #0          SEQFLAG=0
93A3:8D 05 92           STA  SEQFLAG
93A6:4C 28 92           JMP  BEEPNIT
93A9:          *
93A9:C8        OKSEQ    INY              ELSE, IF FOUND
93AA:B1 FE              LDA  (PTR),Y     SAVE POINTER TO STRING
93AC:AA                 TAX
93AD:C8                 INY
93AE:B1 FE              LDA  (PTR),Y
93B0:85 FF              STA  PTR+1
93B2:8A                 TXA
93B3:85 FE              STA  PTR
93B5:CE 08 92           DEC  SEQOFLG     SET SEQUNCE OUT FLAG VALID
93B8:4C 33 92           JMP  SEQCHK
93BB:          ****************************************************************
93BB:AD 00 92  DIT      LDA  ELEMTIM     PRODUCE DIT TONE
93BE:0A                 ASL  A
93BF:A8                 TAY
93C0:A9 80              LDA  #TONE
93C2:4A                 LSR  A
93C3:AA                 TAX
93C4:38                 SEC
93C5:20 32 94           JSR  TIMER
93C8:AC 00 92           LDY  ELEMTIM     TIME OUT ONE ELEMENT TIME
93CB:A2 80              LDX  #TONE
93CD:18                 CLC
93CE:20 32 94           JSR  TIMER
93D1:          *
93D1:AD 07 92           LDA  CHWORD      SHIFT DIT INTO CHARACTER WORD
93D4:0A                 ASL  A
93D5:30 30              BMI  EDCHK       ...IF 7 DIT-DAH'S
93D7:8D 07 92           STA  CHWORD      ELSE,
93DA:A9 02              LDA  #2          INIT TCOUNT
93DC:8D 06 92           STA  TCOUNT
93DF:4C B1 92           JMP  POLLOOP     AND LOOK FOR NEXT CONTACT CLOSURE
93E2:          ****************************************************************
93E2:AC 00 92  DAH      LDY  ELEMTIM     PRODUCE DAH SOUND
93E5:A2 80              LDX  #TONE
93E7:38                 SEC
93E8:20 32 94           JSR  TIMER
93EB:          *
93EB:AC 00 92           LDY  ELEMTIM     PAUSE ONE ELEMENT TIME
93EE:A2 80              LDX  #TONE
93F0:18                 CLC
93F1:20 32 94           JSR  TIMER
93F4:          *
93F4:AD 07 92           LDA  CHWORD      SHIFT DAH INTO CHWORD
93F7:0A                 ASL  A
93F8:30 0D              BMI  EDCHK       ...IF 7 DIT-DAH'S
93FA:09 01              ORA  #1          ELSE,
93FC:8D 07 92           STA  CHWORD
93FF:A9 02              LDA  #2          INIT TCOUNT
9401:8D 06 92           STA  TCOUNT
9404:4C B1 92           JMP  POLLOOP
9407:          ****************************************************************
9407:C9 80     EDCHK    CMP  #128        IF 7 DITS,
9409:D0 0B              BNE  EDCHK1
940B:4A                 LSR  A
940C:8D 07 92           STA  CHWORD
940F:CE 01 92           DEC  EDITFLG     EDITFLG=-1
9412:A9 15              LDA  #$15        "RIGHT ARROW"
9414:10 0D              BPL  EDCHK2
9416:C9 FE     EDCHK1   CMP  #254        IF 7 DAH'S
9418:D0 0C              BNE  EDCHK3
941A:4A                 LSR  A
941B:8D 07 92           STA  CHWORD
941E:CE 01 92           DEC  EDITFLG     EDITFLG=-1
9421:A9 08              LDA  #08         "LEFT ARROW"
9423:4C 72 93  EDCHK2   JMP  OUTCHS
9426:4C 28 92  EDCHK3   JMP  BEEPNIT     IF GARBAGE,BEEP
9429:          ****************************************************************

9429:A0 0A     BEEP     LDY  #10         PRODUCE A SHORT BEEP TONE
942B:A2 28              LDX  #40
942D:38                 SEC
942E:20 32 94           JSR  TIMER
9431:60                 RTS
9432:          ****************************************************************
9432:B0 04     TIMER    BCS  TIM0        IF CARRY SET,
9434:A9 61              LDA  #$61        PATCH TO TOGGLE SOUND
9436:90 02              BCC  TIM01
9438:A9 30     TIM0     LDA  #$30        ELSE, DUMMY ADDRESS
943A:8D 47 94  TIM01    STA  PATCH+1
943D:A9 40     TLP1     LDA  #$40        OUTER LOOP
943F:48        TLP11    PHA
9440:8A                 TXA              TONE LOOP
9441:38                 SEC
9442:E9 01     TLP2     SBC  #1
9444:D0 FC              BNE  TLP2
9446:AD 30 C0  PATCH    LDA  SOUND
9449:68                 PLA
944A:38                 SEC
944B:E9 01              SBC  #1
944D:D0 F0              BNE  TLP11
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```
944F:88          321          DEY
9450:D0 EB       322          BNE  TLP1
9452:60          323          RTS
9453:            324 ****************************************************************
9453:02 45 03    325 NRMTABL  DFB  2,$45,3,$54,4,$49,5,$41
9456:54 04 49
9459:05 41
945B:06 4E 07    326          DFB  6,$4E,7,$4D,8,$53,9,$55
945E:4D 08 53
9461:09 55
9463:0A 52 0B    327          DFB  10,$52,11,$57,12,$44,13,$4B
9466:57 0C 44
9469:0D 4B
946B:0E 47 0F    328          DFB  14,$47,15,$4F,16,$48,17,$56
946E:4F 10 48
9471:11 56
9473:12 46 13    329          DFB  18,$46,19,$20,20,$4C,21,$0A
9476:20 14 4C
9479:15 0A
947B:16 50 17    330          DFB  22,$50,23,$4A,24,$42,25,$58
947E:4A 18 42
9481:19 58
9483:1A 43 1B    331          DFB  26,$43,27,$59,28,$5A,29,$51
9486:59 1C 5A
9489:1D 51
948B:1E 0D 1F    332          DFB  30,$0D,31,$08
948E:08
948F:2F 31 27    333          DFB  $2F,$31,$27,$32,$23,$33
9492:32 23 33
9495:21 34 20    334          DFB  $21,$34,$20,$35,$30,$36
9498:35 30 36
949B:38 37 3C    335          DFB  $38,$37,$3C,$38,$3E,$39
949E:38 3E 39
94A1:3F 30 78    336          DFB  $3F,$30,$78,$3A,$6A,$3B
94A4:3A 6A 3B
94A7:73 2C 41    337          DFB  $73,$2C,$41,$2D,$55,$2E
94AA:2D 55 2E
94AD:43 2F 4F    338          DFB  $43,$2F,$4F,$1B,00
94B0:1B 00
94B2:53 94       339 NRMLPTR  DW   NRMTABL
94B4:02 05 03    340 CNTLTBL  DFB  2,$05,3,$14,4,$09,5,$0
94B7:14 04 09
94BA:05 00
94BC:06 0E 07    341          DFB  6,$0E,7,$0D,8,$13,9,$15
94BF:0D 08 13
94C2:09 15
94C4:0A 12 0B    342          DFB  10,$12,11,$17,12,$04,13,$0B
94C7:17 0C 04
94CA:0D 0B
94CC:0E 07 0F    343          DFB  14,$07,15,$0F,16,$08,17,$16
94CF:0F 10 08
94D2:11 16
94D4:12 06 14    344          DFB  18,$06,20,$0C,22,$10,23,$0A
94D7:0C 16 10
94DA:17 0A
94DC:18 02 19    345          DFB  24,$02,25,$18,26,$03,27,$19
94DF:18 1A 03
94E2:1B 19
94E4:1C 1A 1D    346          DFB  28,$1A,29,$11,00
94E7:11 00
94E9:B4 94       347 CNTLPTR  DW   CNTLTBL
9500:            348          ORG  ELEMTIM+$300
9500:06 5E 16    349 SHFTBL   DFB  $06,$5E,$16,$40,$2F,$21,$27,$22
9503:40 2F 21
9506:27 22
9508:23 23 21    350          DFB  $23,$23,$21,$24,$20,$25,$30,$26
950B:24 20 25
950E:30 26
9510:38 27 3C    351          DFB  $38,$27,$3C,$28,$3E,$29,$78,$2A
9513:28 3E 29
9516:78 2A
9518:6A 2B 73    352          DFB  $6A,$2B,$73,$3C,$41,$3D,$55,$3E
951B:3C 41 3D
951E:55 3E
9520:43 3F 07    353          DFB  $43,$3F,$07,$5D,00
9523:5D 00
9525:00 95       354 SHFTPTR  DW   SHFTBL
9527:29 95       355 SEQPTR   DW   SEQTBL
9529:09          356 SEQTBL   DFB  $09
952A:48 95       357          DW   SEQU
952C:14          358          DFB  $14
952D:4C 95       359          DW   SEQL
952F:1A          360          DFB  $1A
9530:74 95       361          DW   SEQC
9532:10          362          DFB  $10
9533:58 95       363          DW   SEQH
9535:07          364          DFB  $07
9536:63 95       365          DW   SEQM
9538:08          366          DFB  $08
9539:6E 95       367          DW   SEQS
953B:0A          368          DFB  $0A
953C:50 95       369          DW   SEQR
953E:0C          370          DFB  $0C
953F:54 95       371          DW   SEQD
```

Serial Code Keyboard, continued...

```
9541:18          372          DFB   $18
9542:7D 95       373          DW    SEQB
9544:0E          374          DFB   $0E
9545:7F 95       375          DW    SEQG
9547:00          376          DFB   00
9548:            377          MSB   OFF
9548:1B FF 49    378 SEQU     DFB   $1B,$FF,$49,00
954B:00
954C:1B FF 4A    379 SEQL     DFB   $1B,$FF,$4A,00
954F:00
9550:1B FF 4B    380 SEQR     DFB   $1B,$FF,$4B,00
9553:00
9554:1B FF 4D    381 SEQD     DFB   $1B,$FF,$4D,00
9557:00
9558:52 55 4E    382 SEQH     ASC   "RUN      HELLO"
955B:20 48 45
955E:4C 4C 4F
9561:0D 00       383          DFB   $0D,$00
9563:43 41 4C    384 SEQM     ASC   "CALL     -151"
9566:4C 20 2D
9569:31 35 31
956C:0D 00       385          DFB   $0D,$00
956E:48 4F 4D    386 SEQS     ASC   "HOME"
9571:45
9572:0D 00       387          DFB   $0D,$00
9574:43 41 54    388 SEQC     ASC   "CATALOG"
9577:41 4C 4F
957A:47
957B:0D 00       389          DFB   $0D,$00
957D:FF 07       390 SEQB     DFB   $FF,$07
957F:1B 40 1B    391 SEQG     DFB   $1B,$40,$1B,$43,$1B,$43,$1B,$43,$1B,$43
9582:43 1B 43
9585:1B 43 1B
9588:43
9589:20 20 20    392          ASC   "                     HELLO GUESTS !"
958C:20 20 20
958F:20 20 20
9592:20 20 20
9595:20 48 45
9598:4C 4C 4F
959B:20 47 55
959E:45 53 54
95A1:53 20 21
95A4:00          393          DFB   $00
*** SUCCESSFUL ASSEMBLY: NO ERRORS
```

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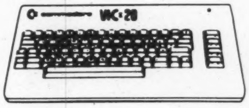

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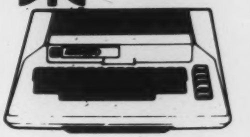

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CIRCLE 134 ON READER SERVICE CARD

Using The Game Paddle In The Laboratory And Classroom

John F. De Gilio

Many teachers think the hand controllers (game paddles) that attach to the microcomputer are frivolous and don't belong in the laboratory or classroom. The association of controllers with game playing has given them a bad reputation, but sometimes entering data through the game paddles is better than using the keyboard.

I offer a rationale and a method for using the hand controllers in the design of software for student use. For illustrative purposes, I use the Apple computer code, but the logic is easily converted to other computer systems.

When a teacher brings a microcomputer to the class or laboratory as a "number cruncher" to process student data, he can expect the longest queue to be students awaiting their turn to enter data on the keyboard. This nonproductive time results from students' inexperience with a keyboard and the need to press the return as well as the inability of the computer to process more than one student's data at a time. The game paddles reduce data entry time because they rely only on the student's ability to turn a knob and press a button. For very young or unskilled students and large classes, to approach two paddles on a stand is less threatening than to face an entire keyboard. The teacher spends less pre-lab time explaining how to use the computer. In addition, by down playing the role of the computer, the focus remains on the laboratory exercise.

Setting Up

You will need a laboratory stand with a sturdy rectangular base and a short upright bar to which the hand controllers may be attached with clamps, rubber bands, or masking tape. The monitor, facing away from the keyboard, is placed on the computer and beside the paddle stands. Students, with the data that they have collected or derived, approach the paddles and turn the knobs on the controllers while watching the screen. The numbers change on the screen until they match the student's data. In this way, the student can input two variables. When the screen matches the student data, the student presses the button on the side of the controller, and the computer processes the data and flashes the information on the screen. The other paddle button resets the screen for the next student, and the process begins again.

For this type of application you must create an initialization module that enables the teacher to set parameters and a use module for the student. Before the class, the teacher loads the program, sets the maximum values to be displayed by each paddle, the precision, and the units and format for displayed values. Once the parameters are set, the teacher switches to the use mode for students.

Programming

The Basic computer language has built in a facility to read the value of the knob settings and determine whether the button on the side has been pressed. In Applesoft Basic, you can do this with the following programming lines:

```
95 HOME
100 X=PDL(0):REM READ PADDLE ZERO
120 VTAB 10:PRINT "PADDLE ZERO SETTING = ":X
140 Y=PDL(1):REM READ PADDLE ONE
150 VTAB 12:PRINT "PADDLE ONE SETTING = ";Y
200 GOTO 100
```

The game controllers are numbered 0 and 1 and should be clearly marked to distinguish them. The values generated by both paddles are between 0 and 255, depending on the amount of rotation. Because partial rotation is a fraction of a complete turn, it can be expressed as the decimal equivalent of the full rotation. Inclusion of the following code lines makes that adjustment:

```
105 X=(255 - X)/255
145 Y=(255 - Y)/255
```

These code lines generate values of X and Y that range between 0 and 1. The following lines allow for setting the maximum values to be generated by each paddle:

```
10 PRINT "ENTER SCALE MAXIMUM FOR PADDLE ZERO":
15 INPUT M0
20 PRINT "ENTER SCALE MAXIMUM FOR PADDLE ONE":
25 INPUT M1

110 X=M0 * X : REM ADJUST PDL 0 TO MAX VALUE
147 Y=M1 * Y : REM ADJUST PDL 1 TO MAX VALUE
```

With the inclusion of the statements above, the values gener-

---

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CIRCLE 263 ON READER SERVICE CARD

ated by the paddles will range between zero and the set maximum. Then you must round them to the appropriate decimal place, which is determined by the accuracy of the measuring instruments that the students use. It is important to set the number of decimal places under program control. To do this, add the following statements:

```
30 PRINT "HOW MANY DECIMAL PLACES FOR PADDLE 0"
35 INPUT F0
40 PRINT "HOW MANY DECIMAL PLACES FOR PADDLE 1"
45 INPUT F1
50 REM SET THE ROUNDING PLACE FOR EACH PADDLE
55 K0 = 5 * (1 / 10 ^ (F0 +1))
60 K1 = 5 * (1 / 10 ^ (F1 +1))
114 REM ROUNDING ALGORITHM FOR PADDLE 0
115 X = INT ( 10 ^ F0 * ( X + K0 )) / 10 ^ F0
148 Y = INT ( 10 ^ F1 * ( Y + K1 )) / 10 ^ F1
```

Now the values are right, but because of printing problems you must format the data and print them properly.

```
117 X$ = RIGHT$( "        "+ STR$(X),8)
149 Y$ = RIGHT$( "        "+ STR$(Y),8)
```

Change the print statements for character data.

```
120 VTAB 10: PRINT "PADDLE ZERO SETTING = ";X$
150 VTAB 12: PRINT "PADDLE ONE SETTING = ";Y$
```

When the program is run, the paddle values are in a clear, readable form at the precision dictated by the teacher. Then include those lines for which the function is intended. With the values collected by the students, incorporate the algorithm that processes the values. In the illustration you multiply the values input through the paddles. Any Basic arithmetic statement could be substituted. It could be as easy as addition or multiplication, but it also could include any algorithm that requires two variables to solve for an unknown. To ensure that the computer is working with the values that are being displayed to the student, turn the character values (X$ and Y$) to numeric form. In the illustration I do not format the result and leave it to readers who want to use the function in this form:

```
200 Z = VAL(X$) * VAL(Y$)
220 VTAB 14: PRINT "PADDLE PRODUCT = ";Z
240 GOTO 100
```

Ending The Function

The last problem is to end the function in a normal fashion. You have the opportunity to use the button on the side of the paddles. Usually when the paddle button is not being pushed, a random number is being stored in a particular location in the machine. As soon as the button is pushed, that random value jumps to a number greater than 127. The program can tell the button has been pushed by checking the core location and testing the number that has been stored there. Each paddle button has its own location. For paddle 0 button you can test for a pushed button by PEEK(- 16287). To test paddle 1 use PEEK(- 16286). In Listing 1 you use the paddle 1 button to end the function. That is, when the value returned by the PEEK is less than 127, you read the paddles; when it is higher than 127, you end the program.

```
240 IF PEEK( - 16286) < 127 THEN 100
250 END
```

Listing 1.

```
10  PRINT "ENTER SCALE MAXIMUM FOR PADDLE 0"
15  INPUT M0
20  PRINT "ENTER SCALE MAXIMUM FOR PADDLE 1"
25  INPUT M1
30  PRINT "HOW MANY DECIMAL PLACES FOR PADDLE 0"
35  INPUT F0
40  PRINT "HOW MANY DECIMAL PLACES FOR PADDLE 1"
45  INPUT F1
50  REM   SET THE ROUNDING PLACE FOR EACH PADDLE
55 K0 = 5 * (1 / 10 ^ (F0 + 1))
60 K1 = 5 * (1 / 10 ^ (F1 + 1))
95  HOME
100 X =  PDL (0)
105 X = (255 - X) / 255
110 X = M0 * X
115 X =  INT (10 ^ F0 * (X + K0)) / 10 ^ F0
117 X$ =  RIGHT$ ("          " +  STR$ (X),8)
120  VTAB 10: PRINT "PADDLE ZERO SETTING = ";X$
140 Y =  PDL (1)
145 Y = (255 - Y) / 255
147 Y = M1 * Y
148 Y =  INT (10 ^ F1 * (Y + K1)) / 10 ^ F1
149 Y$ =  RIGHT$ ("          " +  STR$ (Y),8)
150  VTAB 12: PRINT "PADDLE ONE SETTING  = ";Y$
200 Z =  VAL (X$) *  VAL (Y$)
220  VTAB 14: PRINT "PADDLE PRODUCT = ";Z
230  VTAB 21: PRINT "PRESS PADDLE 1 BUTTON TO END"
240  IF  PEEK ( - 16286) < 127 THEN 100
```

Listing 2 is a more elegant form of this function.

Listing 2.

```
90  HOME
100  VTAB 3: PRINT "ENTER FULL SCALE READING OF PADDLE 0": INPUT
      "";P0
110  VTAB 8: PRINT "ENTER THE UNITS TO BE ATTACHED TO": INPUT
      "PADDLE 0 VALUES ";U0$
120  VTAB 12: PRINT "WHAT IS THE NUMBER OF DECIMAL PLACES": INPUT
      "ARE TO BE USED FOR PADDLE 0? ";F0
122  VTAB 16: INVERSE : PRINT "PADDLE 0 TEST": NORMAL
125  VTAB 23: PRINT "PRINT PADDLE BUTTON TO PROCEED"
130 X =  PDL (0):P = P0:F = F0: GOSUB 1000
160  VTAB 19: PRINT "PADDLE 0 =  ";Z$;" ";U0$
170  IF  PEEK ( - 16287) < 127 THEN 130
180  HOME : PRINT "PADDLE 1 CALIBRATION"
200  VTAB 3: PRINT "ENTER FULL SCALE READING OF PADDLE 1": INPUT
      "";P1
210  VTAB 8: PRINT "ENTER THE UNITS TO BE ATTACHED TO": INPUT
      "PADDLE 1 VALUES ";U1$
220  VTAB 12: PRINT "WHAT IS THE NUMBER OF DECIMAL PLACES": INPUT
      "ARE TO BE USED FOR PADDLE 1? ";F1
222  VTAB 16: INVERSE : PRINT "PADDLE 1 TEST": NORMAL
230 X =  PDL (1):P = P1:F = F1: GOSUB 1000
260  VTAB 19: PRINT "PADDLE 1=  ";Z$;" ";U1$
270  IF  PEEK ( - 16286) < 127 THEN 230
280  HOME : VTAB 3: HTAB 10: INVERSE : PRINT "ANSWER SET": NORMAL

285  VTAB 8: PRINT "WHAT UNITS ARE TO BE USED TO DISPLAY": INPUT
      "THE RESULT? ";UZ$
290  VTAB 12: PRINT "HOW MANY DECIMAL PLACES ARE TO BE": INPUT
      "IN PRINTING THE RESULT? ";FZ
300  HOME : VTAB 3: HTAB 10: INVERSE : PRINT "PADDLE LAB": NORMAL

330 X =  PDL (0):F = F0:P = P0: GOSUB 1000:A$ = Z$
360  VTAB 12: PRINT "PADDLE 0 =  ";A$;" ";U0$
430 X =  PDL (1):F = F1:P = P1: GOSUB 1000:B$ = Z$
460  VTAB 16: PRINT "PADDLE 1 =  ";B$;" ";U1$
500 Y =  VAL (A$) *  VAL (B$)
510 F = FZ:X = Y: GOSUB 1005
530  VTAB 21: PRINT "PRODUCT  =   ";Z$;"  ";UZ$
800  IF ( PEEK ( - 16286) < 127) OR ( PEEK ( - 16287) < 127)
      THEN 330
900  END
1000 X = P * ((255 - X)) / 255
1005 R = 1 / 10 ^ F:K = 5 * (1 / 10 ^ (F + 1))
1010 V$ =  STR$ (( INT (10 ^ F * (X + K))) / 10 ^ F)
1015 Z$ =  RIGHT$ ("          " + V$,8)
1020  RETURN
```

You can adjust the algorithm for calculations to do many tasks in the laboratory or classroom. For example, the algorithm can be used to input voltage and amperage to calculate the resistance in an Ohms law lab. With a little programming finesse, it can use all four paddle inputs to calculate multiple resistors in series and in parallel circuits. Wattage, density, frequency, wavelength, vector analysis, radioactive decay, percentage composition, pH, calorimetry, and electrochemistry problems may be solved this way.

A Range Finder

Other applications use the paddle directly to measure for problem solving. Students learn how specialized computers are used to solve problems. To illustrate this method, let's look at how the paddles are used to create a "range finder." This device, which cuts across a wide spectrum of curricula, could be part of a study of geology, astronomy, physics, or physical science. The object of a range finder is to determine the distance to an object measured by indirect means.

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CIRCLE 120 ON READER SERVICE CARD

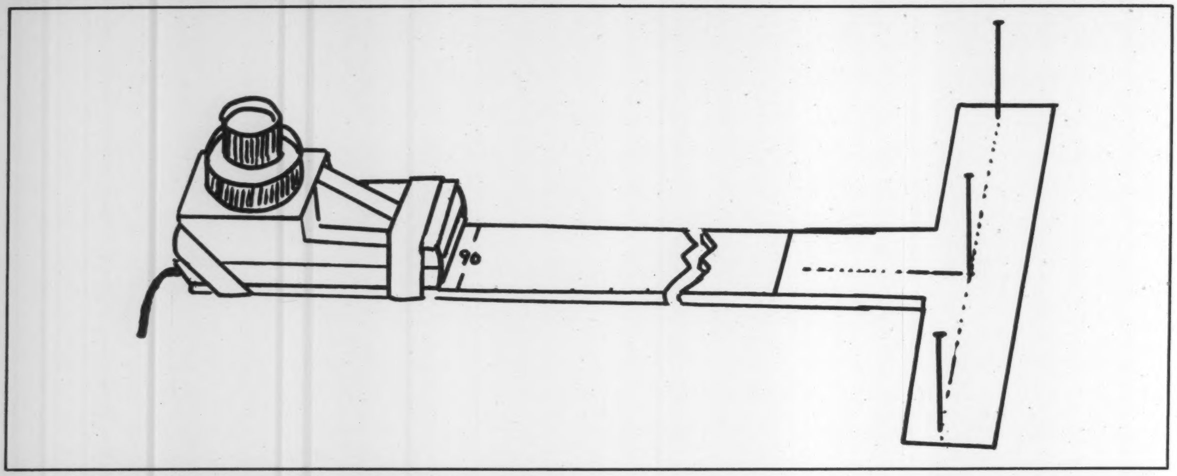
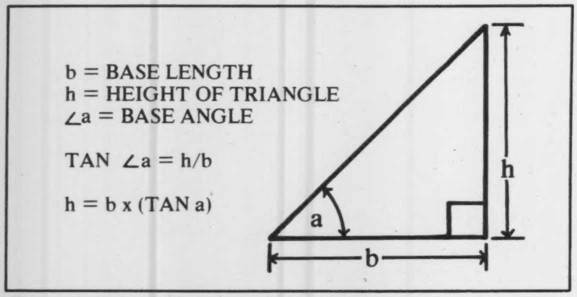


Figure 2. Rangefinder apparatus is constructed from a meter stick, cardboard "T", and game paddle.

Photo 1. Taking a sighting with the rangefinder.

The principle of a range finder is based on trigonometric functions known to every student of elementary algebra. The concept is that "the product of the tangent of the base angle of a right triangle and the base length determines its altitude" (Figure 1).



b = BASE LENGTH
h = HEIGHT OF TRIANGLE
$\angle a$ = BASE ANGLE

TAN $\angle a = h/b$

$h = b \times (\text{TAN } a)$

Figure 1. Relationships in a right triangle.

You need only an angle measuring device and a measured base line. A computer range finder can be constructed by taping a game paddle over the end of a meter stick, ensuring the center of the turning knob is over the one-meter mark (Figure 2). To the other end of the meter stick, fix a T cut from sturdy cardboard. The downstroke of the "T" is carefully taped to the side of the meter stick away from the paddle. Place three sighting pins in the horizontal bar of the T, so they can be used as sights. The middle pin is used to verify the alignment of the paddle to ensure a right angle.

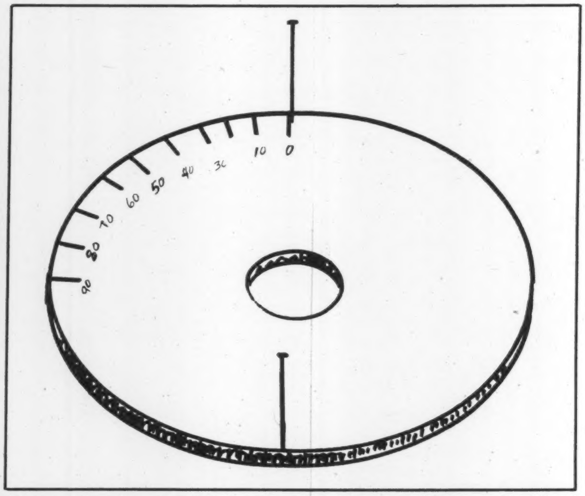


Figure 3. Circular dial marked in degrees fits over knob of paddle.

Cut a circular dial from stiff cardboard and mark it with 0 to 180 degrees counter-clockwise (Figure 3). In the center of the circular card cut a hole that will fit snugly over the paddle knob. Place a sighting pin in the 0 and 180 degree mark. The accuracy of the sighting circle is dependent, in part, on the diameter.

The calibration module must allow for the input of the base length. Check the orientation of the dial sights; reset the card on the knob, so when the angle is measured visually it agrees with the angle projected on the screen. Once the calibration is complete, the measuring module projects the continuous distance from the angle between the base and 90 degrees.

The student sights the target whose distance is to be determined with the T end of the base line. His partner sights along the pins on the dial card to the target, and the screen shows the distance to the target.

The program (Listing 3) is designed in four segments: the menu, the instructions to construct the device, the calibration module, and the use module.

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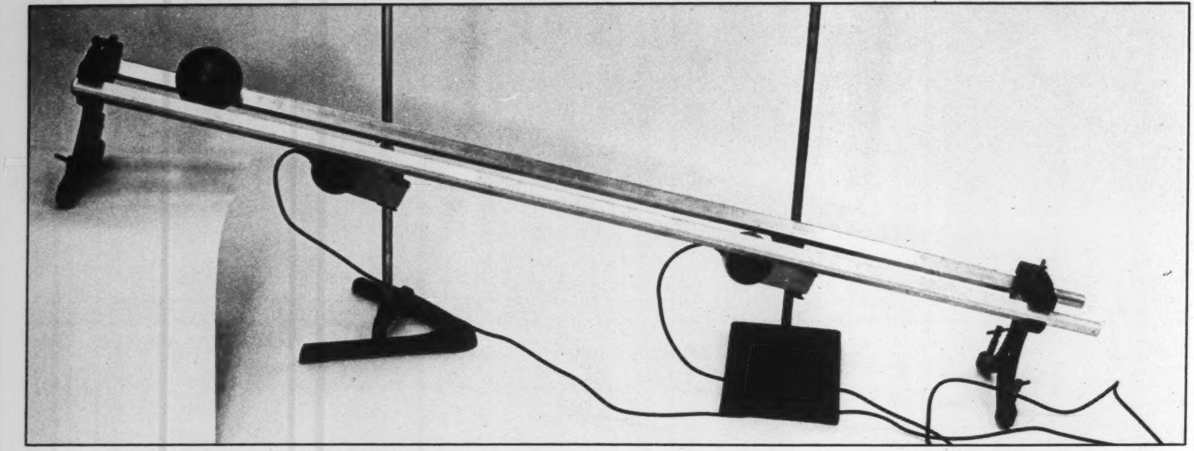

Photo 2. Side view of the velocity/acceleration timer.

You may want to improve the basic design. For example, the sighting pins can be replaced with a mirror, beam splitter, and laser for a more accurate and dramatic demonstration. With some rebuilding, the function could be adapted for both paddles and would use the Law of Sines, eliminating the need for the right triangle.

Measuring Acceleration

Another laboratory use for the game paddles is a reasonably accurate timer to determine the velocity and acceleration of

Listing 3.

```
10  TEXT : HOME : VTAB 1: HTAB 10: INVERSE : PRINT "PADDLE R
     ANGEFINDER LAB": NORMAL : POKE 34,5
11  REM
12  REM   ******  MENU SEGMENT  ******
13  REM
15  POKE 32,5
20  VTAB 8: PRINT "WHICH WOULD YOU LIKE TO DO:"
30  VTAB 10: PRINT "1. GET DIRECTIONS FOR SET UP"
40  VTAB 12: PRINT "2. CALIBRATE RANGE FINDER"
60  VTAB 14: PRINT "3. USE RANGE FINDER."
70  VTAB 16: PRINT "4. END FOR NOW"
80  VTAB 22: PRINT "ENTER A 1 2 3 OR 4 PLEASE. ";: GET A$:A =
     VAL (A$)
90  ON A GOTO 1000,2000,3000,4000
100  GOTO 80
1000  VTAB 3: HTAB 8: PRINT "DIRECTIONS SEGMENT": POKE 34,4:
      POKE 32,0
1004  REM
1005  REM  ****** DIRECTIONS SEGMENT ******
1006  REM
1010  HOME : PRINT "STEP 1. TAPE PADDLE 0 TO THE END OF A": HTAB
     9: PRINT "METER STICK SO DIAL IS OVER 100": HTAB 9: PRINT
     "CENTIMETER MARK."
1020  PRINT : PRINT "STEP 2. CUT POLAR CORDINATE GRAPH PAPER
     ": HTAB 9: PRINT "GLUED TO STIFF CARDBOARD IN A": HTAB
     9: PRINT "15 CENTIMETER CIRCLE."
1030  PRINT : PRINT "STEP 3. MARK DISK WITH DEGREES STARTING
     ": HTAB 9: PRINT "AT 0 AT 10 DEGREES INTERVALS TO": HTAB
     9: PRINT "90 DEGREES. NUMBER IN A COUNTER": HTAB 9: PRINT
     "CLOCKWISE DIRECTION."
1040  PRINT : PRINT "STEP 4. INSERT SIGHTING PINS IN EDGE OF
     ": HTAB 9: PRINT "OF THE DISK AT THE 0 AND 180": HTAB 9
     : PRINT "DEGREE LOCATIONS."
1050  PRINT : PRINT : HTAB 10: INPUT "PRESS <RETURN> TO CONT
     INUE ";S$
1060  HOME : PRINT "STEP 5. CUT A STRIP OF CARDBOARD 15": HTAB
     9: PRINT "CENTIMETERS LONG AND 2 CENTI-": HTAB 9: PRINT
     "METERS WIDE. PLACE SIGHTING": HTAB 9: PRINT "PINS AT T
     HE CENTER OF THE SHORT": HTAB 9: PRINT "EDGE."
1070  PRINT : PRINT "STEP 6. STAPLE SIGHTING STRIP TO 0 END"
     : HTAB 9: PRINT "OF METER STICK. MAKE SURE THE": HTAB 9
     : PRINT "SIGHTING LINE IS SET AT RIGHT": HTAB 9: PRINT
     "ANGLES TO THE METER STICK."
1080  PRINT : PRINT "STEP 7. CUT HOLE IN THE CENTER OF THE":
      HTAB 9: PRINT "DISK SO IT MAKES A SNUG FIT ON": HTAB 9
     : PRINT "THE PADDLE KNOB."
1090  PRINT : PRINT "STEP 8. CONSTRUCT A REFERENCE PIN IN": HTAB
     9: PRINT "THE CENTER OF THE METER STICK ": HTAB 9: PRINT
     "AT THE EDGE OF THE DIAL TO MARK": HTAB 9: PRINT "ANGLE
     S."
1100  HTAB 22: INPUT "PRESS <RETURN>";S$
1110  GOTO 10
```

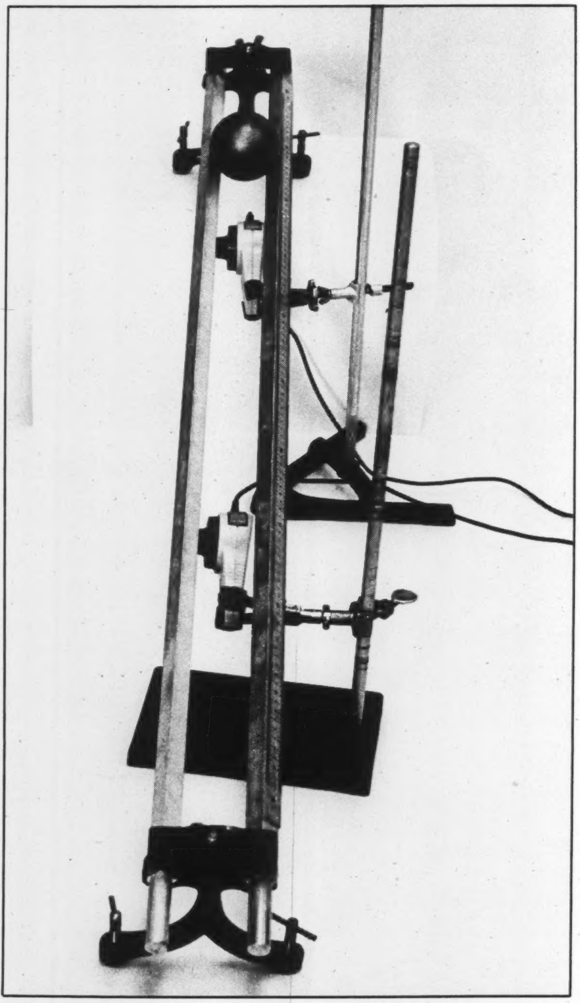

Photo 3. Only the paddle buttons are used in the velocity/acceleration timer. The ball must be heavy enough to activate them.

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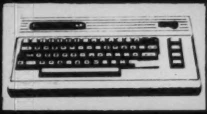

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CIRCLE 175 ON READER SERVICE CARD

```
2997  REM
2998  REM   *****  RANGE FINDER SEGMENT  *****
2999  REM
3000  POKE 32,0: HOME : VTAB 5: HTAB 5: PRINT "PRESS PADDLE
    BUTTON TO TERMINATE"
3002  REM
3003  REM  ** READ PADDLE BUTTONS FOR END OF USE  **
3100 B1 =  PEEK ( - 16286):B0 =  PEEK ( - 16287)
3102  REM
3103  REM  ** RETURN TO MENU IF BUTTON ACTIVATED **
3110  IF (B1 > 127) OR (B0 > 127) THEN 10
3112  REM
3113  REM  ** READ PADDLE 0 AND CONVERT TO DEGREES **
3120 X =  PDL (0):P0 = 232 - 232 * (255 - X) / 255:A0$ =  RIGHT$
    ("      " +  STR$ ( INT (.5 + P0)),4)
3130  VTAB 10: HTAB 5: PRINT "PADDLE 0 ANGLE IS";A0$;"  DEGR
    EES"
3135 Q$ =  RIGHT$ ("      " +  STR$ (DIS),4)
3140  VTAB 13: HTAB 5: PRINT "   BASE LENGTH IS ";Q$;" METER
    S"
3142  REM
3143  REM  ** DETERMINE TANGENT OF PADDLE AND CHANGE **
3144  REM  ** RADIANS TO DEGREES **
3145  REM
3150 TA =  TAN (P0 * 3.14159268 / 180)
3160  IF P0 = 0 OR P0 > 89 THEN 3300
3162  REM
3163  REM  ** DETERMINE ALTITUDE AND ROUND FOR PRINTING **
3164  REM
3170 L = DIS * TA:L0 =  INT (10 * (5 +  INT (100 * L)) / 100
    ) / 10:A$ =  LEFT$ ( STR$ (L0) + "     ",5)
3180  VTAB 19: PRINT "DISTANCE TO TARGET IS ";A$;"METERS.": GOTO
    3100
3300  VTAB 19: PRINT "DISTANCE TO TARGET IS OFF SCALE      ":
     GOTO 3100
3997  REM
3998  REM   **** END SEGMENT  *****
3999  REM
4000  POKE 32,0: POKE 34,0: HOME : END
```

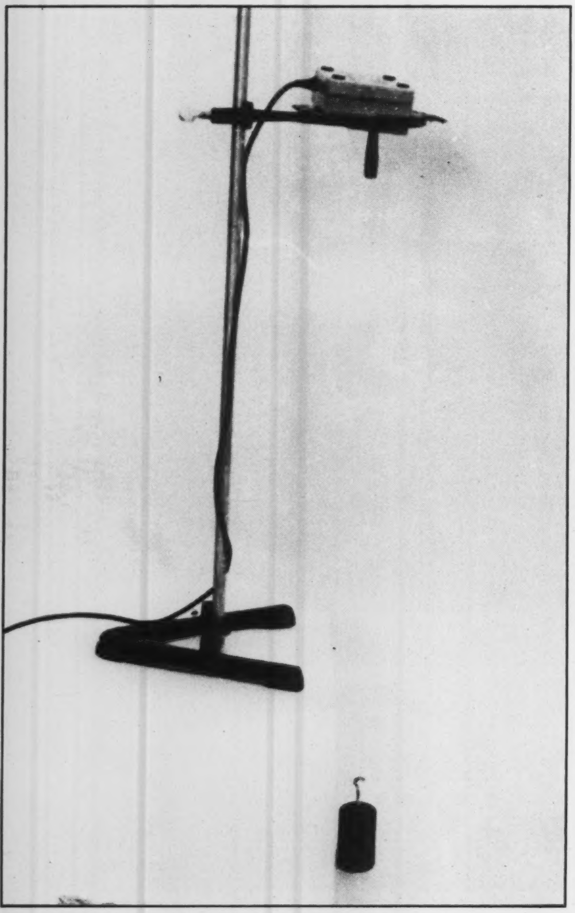

Photo 4. Side view of the joystick pendulum.

moving bodies. If paddle 0 is attached between the rails of an inclined plane and paddle 1 is attached a measured distance down slope, a ball can be used to turn the timer on and off. The program can be modified to measure the acceleration directly. The program below could be used as a timer. Of course, you may want to adjust the delay loop in line 90 for your system.

Joystick Pendulum

A favorite laboratory apparatus uses the joystick as a pendulum. In this case the device is turned upside-down and placed in a long-armed ring stand. A sturdy mass is attached to the handle and it is allowed to swing freely. Inventive students will want to reduce the influence of friction by modifying the joystick and within limits this should be encouraged. Because Basic is generally not fast enough to do the plotting, the program shown in Listing 4 uses a shape table to do the tracing.

Listing 4.

```
10 BASE = 6 * 4096
20  FOR I = BASE TO BASE + 8
30  READ A: POKE I,A: NEXT I
40  POKE 232,0: POKE 233,96
50  HGR2 : HCOLOR= 3: ROT= 0: SCALE= 2
60 X =  PDL (0)
65  IF  PEEK ( - 16287) > 127 THEN 50
67  IF  PEEK ( - 16286) > 127 THEN  END
70 Y =  PDL (1)
75  IF Y > 190 THEN Y = 190
80  XDRAW 1 AT X,Y
100  GOTO 60
110  DATA  1,0,4,0,33,43,48,57,0
```

Summary

I have suggested a few of the uses for paddles in the laboratory and classroom, and invite readers to refine and extend the concept. I have found that students who are equipped with beginning programming skills and an interest in engineering can design ways to use the paddles in other useful measuring instruments such as tone generators, sine wave generators, interferometers, and so forth. Using the computer in the classroom to solve this type of problem helps students to understand the meaning of the "computer revolution." □

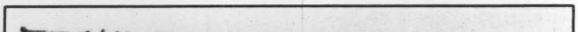

Photo 5. The joystick pendulum looking up from the bottom.

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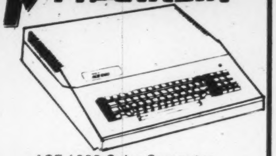

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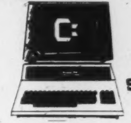

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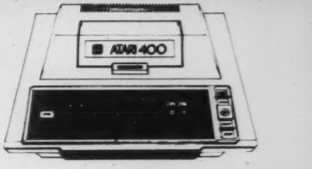

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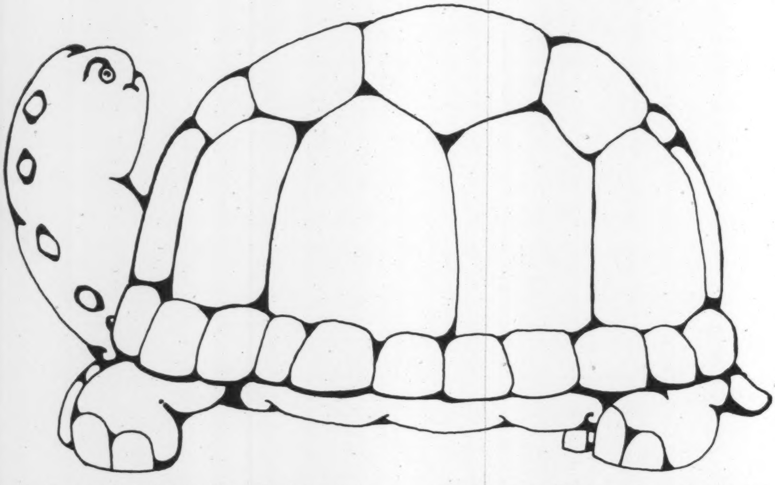
A Turtlegraphics Interpreter in Atari Basic

HTURTLE Revisited

John and Mary Harrison



Ever since reading "HTURTLE: A Turtlegraphics Interpreter in Applesoft" by Al Evans in the July 1982 issue of Creative Computing, I have been fascinated by the idea of using Turtlegraphics in Atari Basic. The major drawback has been the limited number of colors available in the high-resolution modes. Graphics modes 7 and 8 offer respectable resolution (160 × 160 and 320 × 160, respectively) but only four colors in mode 7 and one in mode 8. Enter the GTIA chip and enhanced graphics modes 9, 10, and 11.

These three additional modes give the capability of up to 16 colors on the screen and a resolution of 80 × 192. However these modes are "map" modes and as such offer no provision for a text window. Through the use of a display list interrupt (DLI) a four-line text window has been provided in graphics mode 11. Thus, a suitable environment exists for implementing a Turtlegraphics interpreter in Atari Basic.

Using this expanded capability, I have converted the original Applesoft code to Atari Basic and added three features to the interpreter. The EDIT command deletes the last entered command and erases it from the screen. The PROGRAM command allows a series of commands to be strung together and then executed by the GO command. A HELP function was added to list the commands available. Each of these is more fully described below.

Listing 1 is HTURTLE for the Atari. It functions similarly to the HTURTLE described in the Al Evans article. The maximum X value is 79 and the maximum Y value is 53. The origin (0,0) is located at the bottom left corner of the screen. The Y value of 53 is corrected to allow for similar distances to be covered by a one-unit move in the X or Y direction. The Y value is multiplied by 3 in the program to make this correction and show the full 160-line resolution.

The turtle understands the following commands:

CLEAR: Clears the screen and text window and resets the turtle to the center of the screen (40,26) heading north (0).

COLOR AVAR: Sets one of the eight available colors as the pencolor. Possible values for AVAR are black, orange, pink, purple, blue, turquoise, green, and yellow.

TURN ANGLE: Tells the turtle to turn ANGLE degrees. Positive values are clockwise, negative values are counterclockwise.

TURNTO ANGLE: Tells the turtle to turn to the direction ANGLE.

MOVE DISTANCE: The turtle moves DISTANCE in the direction he is facing. If color is not black, a line is drawn.

MOVETO X,Y: The turtle moves to the specified coordinates. If color is not black, a line is drawn.

TURTLEX: Reports the turtle's current X coordinate.

TURTLEY: Reports the turtle's current Y coordinate.

TURTLEANG: Reports the direction the turtle is facing.

PROGRAM: Stores a sequence of commands. The prompt changes from ? to *? when in the program mode. All other commands may be issued after the PROGRAM command.

GO: Executes the stored sequence of commands. Once the program mode is exited, the program is no longer stored, so GO has no effect.

QUIT: Leaves the interpreter or the program mode, if active.

HELP: Lists the commands for easy reference.

EDIT: Deletes the last command and erases it from the screen. May not be issued twice in succession.

How The Program Works

HTURTLE has three main parts: the initialization routines, the command

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Table 1. Variables Used.

CH$(30)	Entered command
COLR$(100)	String of available colors
CLLR(8)	Number corresponding to color word in COLR$
PAR$(10)	Argument of entered command
NUM1$(5)	First value of a two-number parameter
NUM2$(5)	Second value of a two-number parameter
COM$(10)	Placeholder for data as CMD$ and COLR$ are built
PROGRAM$(1025)	String containing "program"
CMD$(150)	String of available commands
EDPAR$(10)	Parameter of command to be erased
EDNUM1$(5)	First argument of command to be erased
EDNUM2$(5)	Second argument of command to be erased
EDIT	Flag for EDIT command
TCH	Length of entered command
CASE	Number of entered command
EDCASE	Number of command for editing
PROG	Flag for PROGRAM command
NC	Number of available commands
XEQ	Flag for GO command
TX	Turtle's X position
OLDTX	Previous X position
TY	Turtle's Y position
OLDTY	Previous Y position
TA	Turtle's angle
OLDTA	Previous turtle angle
SCOL	Number of color to be displayed
OLDSCOL	Color number to be edited
TWOPI	Value of 2 in degrees, i.e. 360
EDIS	Distance to be erased
ELDX	Initial X position to be erased
ELDY	Initial Y position to be erased
EDX	Final X to be erased
EDY	Final Y to be erased
ETX	Actual X distance to be erased
ETY	Actual Y distance to be erased
DIST	Distance turtle will move
DX	Distance turtle will move in X direction
DY	Distance turtle will move in Y direction
MARKGO	Beginning of command being parsed from PROGRAM$

parser, and the subroutines for each of the commands. Table 1 is a list of all variables used in the program.

The initialization routines (lines 60-100, 10000-11080) set the trigonometric functions to accept degrees rather than radians, dimensions all arrays and string variables, stores the allowable commands in CMD$, stores the available colors in COLR$, and sets up the graphics display (lines 10120-10160). This setup is the only interesting portion of the initialization routine.

The screen is initialized by a graphics 8 call. This provides 320 × 160 resolution plus a four-line text window at the bottom of the screen. Placing 11 in memory address 87 and 192 in memory address 623 causes Basic to recognize this mode as graphics 11, one of the GTIA modes. Locations 560 and 561 hold the address of the display list. In the 167th entry of the display list, the display list interrupt is set by placing a 143 in this location.

The 167th location defines the last line of the display above the text window. Examining the display list reveals that each of the first three entries is 112. This leaves 24 blank lines at the top of the screen. Next comes a load memory scan (LMS) instruction (79), followed by a 2 byte address. This identifies the start of screen memory and the mode of the first line.

Since our display consists of 160 graphics lines, 160 entries (including the LMS) are required to define the display. However, whenever the display crosses a 4K boundary, a new LMS and address must be issued. Since graphics 8 requires 7900 bytes of screen memory, one 4K boundary will be crossed.

Consolidating this information reveals 3 bytes for blank lines and plus 160 bytes for the display plus 2 bytes for the initial screen address plus 2 bytes for the 4K boundary crossing screen address for a total of 167 bytes to reach the final screen line. Thus, the start of the display list plus 166 is the 167th entry. This is where the DLI is called. (For more information on display list composition, see the excellent article by David and Sandy Small, "Atari Graphics Unveiled," July 1981, *Creative Computing.*)

Next a short machine language routine is read in and stored starting at memory location 1536. This is the DLI routine. When called, it causes the bottom of the display to become a text window just as in graphics 8 while the upper portion remains in graphics 11. Locations 512 and 513 hold the two-byte address of the DLI routine (600 Hex = 1536 decimal). Finally the interrupt is enabled by placing 192 into location 54286.

New Commands

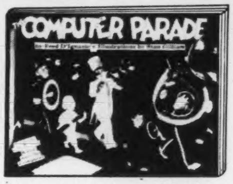
The command parser (lines 100-380) accepts the command from the user. If the program mode is active, the command is added to PROGRAM$ (except QUIT, GO, and HELP). The command is then parsed into the command and parameter strings. If the command is found in the list of allowed commands, the appropriate subroutine is called by line 360. If the command is not allowed, an error message is printed, the command is deleted from PROGRAM$ if added earlier, and control returns to line 120 for the next command.

The command subroutines (lines 3000-7040) perform the tasks requested by the user. These routines check PAR$ for the appropriate parameters, check screen boundaries, and move or turn the turtle as required. Only the GO command routine (lines 6500-6610) requires additional explanation.

In this command the user wishes to execute a stored program. The variable XEQ is set to one, then PROGRAM$ is parsed, looking for the * that separates the various commands in the list. (Atari Basic does not support string arrays.) As each command is found, it is assigned to CH$ and control is returned to the command parser at line 200. Once the command is executed, control is returned to line 6600 from line 370 as long as XEQ=1.

Once the entire PROGRAM$ has been parsed, XEQ is set to zero, and the subroutine returns to the command parser in the program mode. Thus an existing program may be executed and extended numerous times. PROGRAM$ is dimensioned as 1025, so approximately 100 commands may be stored. Once the program mode is exited through the QUIT command, PROGRAM$ is set to the null string and the previous program is deleted.

So there you have it, HTURTLE for the Atari. Now you Atari owners can begin to explore the world of Turtlegraphics. ☐



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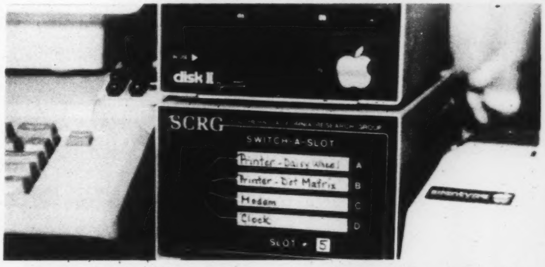

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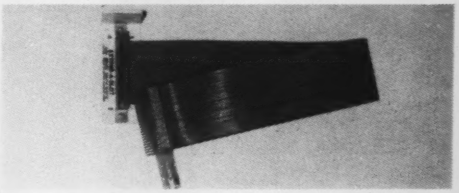

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HTURTLE, continued...

Listing 1.

```
10 REM ******************************
11 REM *      HTURTLE REVISITED     *
12 REM *             BY             *
13 REM *       JOHN AND MARY        *
14 REM *          HARRISON          *
15 REM ******************************
16 REM
20 REM THIS SETS UP THE STRING VARIABLES
21 REM AND CHANGES FROM RADIAN MEASURE
22 REM TO DEGREE MEASURE BEFORE INITIALIZATION
23 REM
60 DEG
70 DIM CH$(30),COLR$(100),CLLR(8),PAR$(10),NUM1$(5),NUM2$(5),COM$(10)
80 DIM PROGRAM$(1025),CMD$(150),EDPAR$(10),EDNUM1$(5),EDNUM2$(5)
90 GOSUB 10000
99 REM
100 REM MAIN LOOP:PARSE COMMAND
101 REM THE MAIN LOOP ACCEPTS AND PARSES
102 REM EACH ENTRY TO SEPARATE THE
103 REM COMMAND FROM ITS PARAMETERS
104 REM
110 EDIT=0
120 CH$="":IF PROG=1 THEN ? "*";
130 INPUT CH$:IF CH$<>"EDIT" THEN TCH=LEN(CH$):GOTO 180
140 IF EDIT=1 THEN ? "You may not EDIT two commands in a row.":GOTO 120
150 EDIT=1:CASE=EDCASE:IF PROG=0 THEN 360
160 IF LEN(PROGRAM$)-TCH<=1 THEN PROGRAM$="":GOTO 360
170 PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-TCH-1):GOTO 360
180 EDIT=0:IF PROG=1 AND CH$="QUIT" THEN 200
190 IF PROG=1 AND CH$<>"GO" AND CH$<>"HELP" THEN PROGRAM$(LEN(PROGRAM$)+1)
    =CH$:PROGRAM$(LEN(PROGRAM$)+1)="*"
200 FOR I=1 TO LEN(CH$)
210 IF CH$(I,I)=" " THEN PAR$=CH$(I+1):CH$=CH$(1,I-1):GOTO 230
220 NEXT I
230 FOR I=0 TO NC-1
240 IF CH$<>CMD$(I*10+1,I*10+LEN(CH$)) THEN 270
250 CASE=I+1:EDCASE=CASE
260 GOTO 310
270 NEXT I
280 ? "I do not understand.  Try again."
290 IF PROG=1 AND LEN(PROGRAM$)<=TCH+1 THEN PROGRAM$="":GOTO 120
300 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-TCH-1):GOTO 120
310 IF LEN(PAR$)=0 THEN 360
320 FOR I=1 TO LEN(PAR$)
330 IF PAR$(I,I)=" " THEN PAR$=PAR$(I+1):GOTO 350
340 NEXT I
350 EDPAR$=PAR$
360 ON CASE GOSUB 1000,1500,2000,2500,3000,3500,4000,4500,5000,5500,6000,
    6500.7000
370 IF XEQ=1 THEN RETURN
380 GOTO 120
999 REM
1000 REM ** CLEAR **
1001 REM THIS ROUTINE ERASES THE SCREEN
1002 REM AND REPOSITIONS THE TURTLE TO
1003 REM THE CENTER OF THE SCREEN FACING
1004 REM NORTH
1005 REM
1010 IF EDIT=1 THEN RETURN
1020 POKE 54286,0:GRAPHICS 8:POKE 87,11:POKE 623,192
1030 POKE PEEK(560)+256*PEEK(561)+166,143
1040 POKE 512,0:POKE 54286,192
1050 SETCOLOR 4,0,8:COLOR 0
1060 TX=40:TY=80:TA=0
1070 RETURN
1499 REM
1500 REM ** COLOR **
1501 REM THIS ROUTINE CHECKS THE DESIRED
1502 REM COLOR AGAINST THOSE AVAILABLE
1503 REM
1510 IF EDIT=1 THEN SCOL=OLDSCOL:COLOR SCOL:RETURN
1520 OLDSCOL=SCOL
1530 IF LEN(PAR$)>10 THEN 1580
1540 FOR I=0 TO 7
1550 IF PAR$<>COLR$(I*10+1,I*10+LEN(PAR$)) THEN 1570
1560 SCOL=2*CLLR(I):COLOR SCOL:RETURN
1570 NEXT I
1580 ? "My colors are: BLACK,ORANGE,PINK":? "PURPLE,BLUE,TURQUOISE,GREEN,
    YELLOW"
1590 IF PROG=1 AND TCH+1<=LEN(PROGRAM$) THEN PROGRAM$=""
    :RETURN
1600 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-TCH-1)
1610 RETURN
1999 REM
2000 REM ** TURN **
2001 REM THIS ROUTINE TURNS THE TURTLE
2002 REM CLOCKWISE (POSITIVE VALUES) OR
2003 REM COUNTERCLOCKWISE (NEGATIVE VALUES)
```

```
2004 REM THROUGH THE STATED NUMBER OF DEGREES
2005 REM
2010 IF EDIT=1 THEN TA=OLDTA:RETURN
2020 OLDTA=TA
2030 TA=TA+VAL(PAR$)
2040 IF TA<0 THEN TA=TA+TWOPI:GOTO 2040
2050 IF TA>=TWOPI THEN TA=TA-TWOPI:GOTO 2050
2060 RETURN
2499 REM
2500 REM ** TURNTO **
2501 REM THIS ROUTINE TURNS THE TURTLE
2502 REM TO A SPECIFIED ANGLE
2503 REM
2510 IF EDIT=1 THEN TA=OLDTA:RETURN
2520 OLDTA=TA
2530 TA=VAL(PAR$)
2540 IF TA<0 THEN TA=TA+TWOPI:GOTO 2540
2550 IF TA>=TWOPI THEN TA=TA-TWOPI:GOTO 2550
2560 RETURN
2999 REM
3000 REM ** MOVE **
3001 REM AFTER CALCULATING THE HORIZONTAL
3002 REM AND VERTICAL DISTANCE TO BE MOVED
3003 REM THIS ROUTINE CHECKS TO SEE THAT
3004 REM THE TURTLE REMAINS ON THE SCREEN
3005 REM BEFORE A LINE IS DRAWN
3006 REM
3010 IF EDIT=0 THEN 3090
3020 EDIS=VAL(EDPAR$):ELDX=TX:ELDY=TY
3030 EDX=EDIS*SIN(180-TA):EDY=3*(EDIS*COS(180-TA))
3040 ETX=ELDX+EDX:ETY=ELDY+EDY
3050 COLOR 0
3060 PLOT ELDX,159-ELDY:DRAWTO ETX,159-ETY
3070 COLOR SCOL:TX=OLDX:TY=OLDY
3080 RETURN
3090 DIST=VAL(PAR$):OLDX=TX:OLDY=TY
3100 DX=DIST*SIN(TA):DY=3*(DIST*COS(TA))
3110 TX=OLDX+DX:TY=OLDY+DY
3120 IF TX<80 AND TX>-1 AND TY<160 AND TY>-1 THEN 3160
3130 TX=OLDX:TY=OLDY:? "Off the screen"
3140 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-TCH-1)
3150 RETURN
3160 PLOT OLDX,159-OLDY:DRAWTO TX,159-TY
3170 RETURN
3499 REM
3500 REM ** MOVETO **
3501 REM THIS ROUTINE MOVES THE TURTLE
3502 REM TO A SPECIFIED X,Y COORDINATE
3503 REM
3510 FOR I=1 TO LEN(PAR$):IF PAR$(I,I)<>"," THEN NEXT I
3520 NUM1$=PAR$(1,I-1):NUM2$=PAR$(I+1)
3530 IF EDIT=0 THEN 3590
3540 ETX=VAL(NUM1$):ETY=3*(VAL(NUM2$))
3550 COLOR 0
3560 PLOT ETX,159-ETY:DRAWTO OLDX,159-OLDY
3570 COLOR SCOL:TX=OLDX:TY=OLDY
3580 RETURN
3590 OLDX=TX:OLDY=TY
3600 IF NUM1$="" OR NUM2$="" THEN ? "I need 2 numbers."
     :RETURN
3610 TX=VAL(NUM1$):TY=3*(VAL(NUM2$))
3620 IF TX<80 AND TX>-1 AND TY<160 AND TY>-1 THEN 3660
3630 TX=OLDX:TY=OLDY:? "Off the screen"
3640 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-
     TCH-1)
3650 RETURN
3660 PLOT OLDX,159-OLDY:DRAWTO TX,159-TY
3670 RETURN
3999 REM
4000 REM ** TURTLEX **
4001 REM THIS ROUTINE DISPLAYS THE TURTLE'S
4002 REM HORIZONTAL (X) POSITION
4003 REM
4010 IF EDIT=1 THEN RETURN
4020 TX=INT(TX+0.5)
4030 ? "TURTLE X = ";TX
4040 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-8)
4050 RETURN
4499 REM
4500 REM ** TURTLEY **
4501 REM THIS ROUTINE DISPLAYS THE TURTLE'S
4502 REM VERTICAL (Y) POSITION
4503 REM
4510 IF EDIT=1 THEN RETURN
4520 TY=INT(TY+0.5)
4530 ? "TURTLE Y = ";TY
4540 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN(PROGRAM$)-8)
4550 RETURN
4999 REM
5000 REM ** TURTLEANG **
5001 REM THIS ROUTINE DISPLAYS THE TURTLE'S
5002 REM HEADING
5003 REM
5010 IF EDIT=1 THEN RETURN
5020 ? "TURTLE ANGLE= ";INT(TA+0.5)
5030 IF PROG=1 THEN PROGRAM$=PROGRAM$(1,LEN
     (PROGRAM$)-10)
5040 RETURN
5499 REM
5500 REM ** QUIT **
5501 REM THIS ROUTINE IS USED TO EXIT
5502 REM THE PROGRAM MODE AND THE EXIT
5503 REM THE ENTIRE INTERPRETER
5504 REM
5510 IF EDIT=1 THEN RETURN
5520 PROG=PROG-1:IF PROG=0 THEN RETURN
5530 ? "See you later.":END
5999 REM
6000 REM ** PROGRAM **
6001 REM THIS ROUTINE SETS THE FLAG FOR
6002 REM PROGRAM MODE
6003 REM
6010 IF EDIT=1 THEN PROG=0:RETURN
6020 PROGRAM$=""
6030 PROG=1
6040 RETURN
6499 REM
6500 REM ** GO **
6501 REM THIS ROUTINE "RUNS" THE LIST OF
6502 REM COMMANDS IN THE PROGRAM STRING
6503 REM
6510 IF EDIT=1 THEN RETURN
6520 IF PROG=0 THEN ? "No program saved.":RETURN
6530 GOSUB 1000:DF=0
6540 XEQ=1:MARKGO=1
6550 CH$="":PAR$="":NUM1$="":NUM2$=""
6560 FOR J=1 TO LEN(PROGRAM$)
6570 IF PROGRAM$(J,J)<>"*" THEN 6610
6580 CH$=PROGRAM$(MARKGO,J-1)
6590 MARKGO=J+1
```

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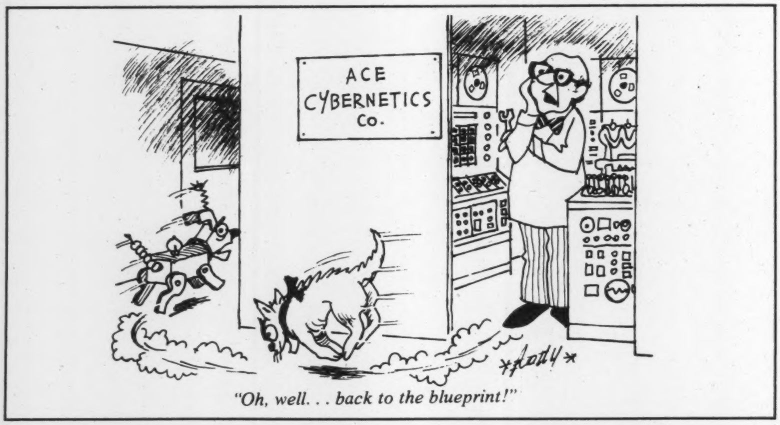
HTURTLE, continued...

Listing 1, continued.

```
6600 GOSUB 200
6610 NEXT J
6620 XEQ=0:RETURN
6999 REM
7000 REM ** HELP **
7001 REM THIS DISPLAYS A LIST OF THE
7002 REM AVAILABLE COMMANDS
7003 REM
7010 IF EDIT=1 THEN RETURN
7020 ? "My commands are: CLEAR,COLOR,TURN"
7030 ? "TURNTO,MOVE,MOVETO,TURTLEX,TURTLEY"
7040 ? "TURTLEANG,QUIT,GO,PROGRAM"
7050 RETURN
9999 REM
10000 REM ** INITIALIZATION **
10001 REM THIS SECTION OF CODE READS
10002 REM IN THE LIST OF AVAILABLE
10003 REM COMMANDS, POSITIONS THE TURTLE
10004 REM TO THE CENTER OF THE SCREEN
10005 REM HEADING NORTH AND PROMPTS THE
10006 REM USER WITH A MESSAGE
10007 REM
10010 TWOPI=360:PROG=0
10020 READ NC
10030 FOR I=0 TO NC-1:READ COM$
10040 CMD$(I*10+1,I*10+LEN(COM$))=COM$
10050 NEXT I
10060 CMD$(LEN(CMD$)+1)="      "
10070 COLR$=""
10080 FOR I=0 TO 7:READ COM$:COLR$(I*10+1,I*10+LEN(COM$))=COM$
10090 CLLR(I)=I
10100 NEXT I
10110 COLR$(LEN(COLR$)+1)="        "
10111 REM
10112 REM SET UP THE DISPLAY LIST
10113 REM INTERRUPT ROUTINE TO PROVIDE
10114 REM A TEXT WINDOW IN GRAPHICS 11
10115 REM
10120 POKE 54286,0:GRAPHICS 8:POKE 87,11:POKE 623,192
10130 POKE PEEK(560)+256*PEEK(561)+166,143:POKE 54286,64
10140 FOR K=0 TO 18:READ P:POKE 1536+K,P:NEXT K:POKE 513,6
10150 POKE 512,0:POKE 54286,192
10160 SETCOLOR 4,0,8:COLOR 0
10170 TX=40:TY=80:TA=0
10180 ? "YOUR TURTLE IS READY"
10190 RETURN
10999 REM
11000 REM ** COMMANDS **
11001 REM DATA STATEMENTS THAT DETAIL
11002 REM THE NUMBER OF AND THE AVAILABLE
11010 DATA 13
11020 DATA CLEAR,COLOR
11030 DATA TURN,TURNTO,MOVE,MOVETO
11040 DATA TURTLEX,TURTLEY,TURTLEANG
11050 DATA QUIT,PROGRAM,GO,HELP
11059 REM
11060 REM ** COLORS **
11061 REM DATA STATEMENTS FOR THE EIGHT
11062 REM AVAILABLE COLORS
11063 REM
11070 DATA BLACK,ORANGE,PINK,PURPLE,BLUE,TURQUOISE,GREEN,YELLOW
11080 DATA 72,173,111,2,41,63,141,10,212,141,27,208,169,0,141,26,208,104,64
```



"Oh, well... back to the blueprint!"

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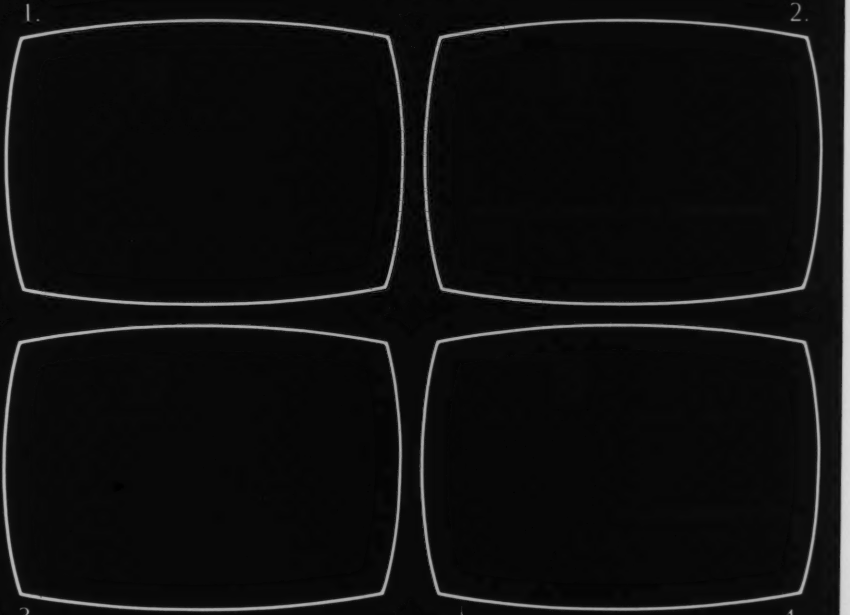

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CIRCLE 250 ON READER SERVICE CARD

Printing Logo Graphics

William A. Beasley

One of my duties as well as my pleasures is to teach computing to people ranging from elementary schoolers to college professors. I have found Logo an excellent tool, and I continually delight at the inverse relationship of age to learning speed. Like most people using Logo I begin teaching with graphics; therein lies the tale at hand.

Graphics, especially in color, are delightful teaching tools. A problem arises when a student wishes to take the product from the class to show playmates or colleagues. The monitor is not portable, and somehow the listing of a procedure does not carry the same fascination as a picture.

It is possible to acquire a printout of a Logo screen by saving the picture to disk (using enormous quantities of disk space), exiting Logo, loading the picture as a binary file, and dumping the binary file. This is awkward, so I decided that something more user-friendly would be helpful.

The Terrapin Logo documentation provides a simple procedure for dumping Logo screens directly through the Orange Micro Grappler printer card. The procedures shown here constitute an elaboration on that procedure, and serve to assume the burden of remembering specific control codes and sequences. They are functional but not terribly elegant, as my grasp of the language remains a bit shaky (Logo programmers above the age of 12 are hard to find around here, and those of the shorter persuasion are rarely helpful on issues of programming style).

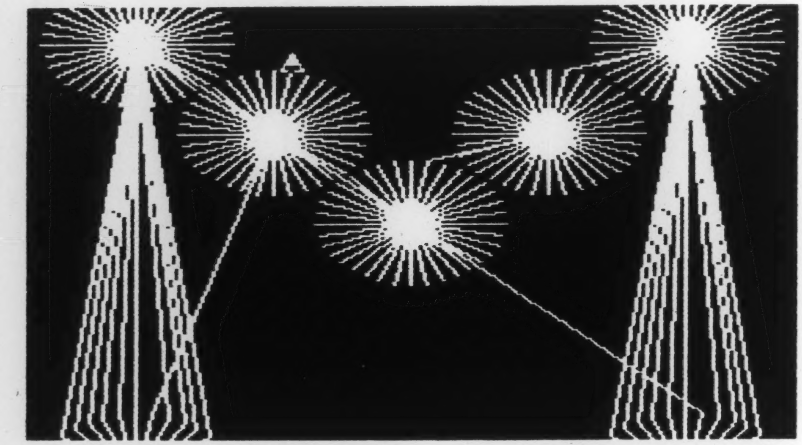

Figure 1. Boom by Evey Fletcher (Grade 4).

There are three procedures, called in sequence. TO HARDCOPY is the initial procedure accessed when one wishes a screen dump. TEXTSCREEN switches from the graphics page to the text page without destroying the graphics. The 14 lines that follow outline the available options. The PRINT command is used here as it would be in Basic.

The next line assigns to the variable the value that is then entered through the keyboard. REQUEST is the INKEY$ counterpart, and FIRST is used to store the value as a word (the first element of the list REQUEST) rather than a list.

FULLSCREEN returns to the graphics display; no more human input is needed. The last line calls the procedure TO DISCRIMINATE and sends to it the current value of WHICH ("WHICH is the name of the variable; :WHICH is the value. It is like the difference in Basic between PRINT "X" and PRINT X.)

The fact that TO DISCRIMINATE carries in its first line :WHICH indicates that it is expecting a value to be passed in. Actually, "WHICH is a local variable here. Although I kept the same name as used in TO HARDCOPY, it can be called just about anything you please as long as all instances of :WHICH in TO DISCRIMINATE are replaced by :YOURNEWNAME. (I suspect I kept the same name partially because my old Basic habits intrude.)

The second line is a simple error trap. The next twelve lines assign values to the variable "SECOND on the basis of the value passed in from TO HARDCOPY. The values assigned are the control commands for the special Grappler functions; WORD is used here to avoid adding spaces between the commands. TO DISCRIMINATE then passes control to TO PRINTER, sending to the new procedure the needed control codes in the form of "SECOND.

There is another local variable in TO PRINTER. In this case I again retained the old name from force of habit, but in fact all instances of :SECOND in TO PRINTER may be replaced by consistent use of :WHATEVERYOUPLEASE.

The next line assigns CTRL-I to the variable "FIRST. CHAR 9 is the Logo equivalent of CHR$(9). Next the value of

---

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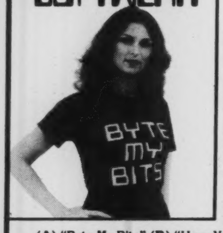

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Logo Graphics, continued...

CTRL-M (carriage return for the Apple) is assigned to the variable THIRD. OUTDEV 1 accesses slot 1, the location of the printer (compare to PR#1).

Then a string of commands is printed out to slot 1; the first is CTRL-I, the second the control codes for the desired special printout features via the Grappler, and the third RETURN. This is the sequence of commands required to activate the Grappler and indeed it seizes control at this point, ignoring the keyboard until the screen has been dumped. OUTDEV 0 returns us to the screen.

Actual use is easy even for me. The three procedures are stored on my Logo file disk under the name EUREKA!.Logo (it seemed an appropriate end to the debugging). After loading Logo, I type READ "EUREKA!. The Apple kindly does so, noting that HARDCOPY, DISCRIMINATE, and PRINTER are defined. I then proceed with whatever graphics routines I desire. When I have a screen I wish to dump, I type HARDCOPY and am presented with my options, from which point the computer takes over.

Figure 1 is a sample screen dump (using option 6) of a program written by one of my shorter colleagues to provide some idea of the results. ☐

Listing 1.

```
PROCEDURE LISTING
*****************

TO HARDCOPY
 TEXTSCREEN
  ( PRINT [HARDCOPY OPTION:CHOICES AS FOLLOWS] )
  ( PRINT [1 NORMAL SCREEN DUMP] )
  ( PRINT [2 EMPHASIZED (TAKES DOUBLE TIME)] )
  ( PRINT [3 INVERSE (BLACK FOR WHITE)] )
  ( PRINT [4 ROTATED 90 DEGREES] )
  ( PRINT [5 DOUBLE SIZE (WILL BE ROTATED)] )
  ( PRINT [6 EMPHASIZED INVERSE] )
  ( PRINT [7 EMPHASIZED ROTATED] )
  ( PRINT [8 EMPHASIZED DOUBLESIZE] )
  ( PRINT [9 INVERSE ROTATED] )
  ( PRINT [10 INVERSE DOUBLESIZE] )
  ( PRINT [11 INVERSE EMPHASIZED ROTATED] )
  ( PRINT [12 INVERSE EMPHASIZED DOUBLESIZE] )
  ( PRINT ) ( PRINT [PLEASE ENTER THE NUMBER YOU WANT] )
 MAKE "WHICH FIRST REQUEST
 FULLSCREEN
 DISCRIMINATE :WHICH
END

TO DISCRIMINATE :WHICH
 IF :WHICH > 12 THEN HARDCOPY
 IF :WHICH = 1 MAKE "SECOND "G ELSE
 IF :WHICH = 2 MAKE "SECOND ( WORD "G "E ) ELSE
 IF :WHICH = 3 MAKE "SECOND ( WORD "G "I ) ELSE
 IF :WHICH = 4 MAKE "SECOND ( WORD "G "R ) ELSE
 IF :WHICH = 5 MAKE "SECOND ( WORD "G "D "R ) ELSE
 IF :WHICH = 6 MAKE "SECOND ( WORD "G "E "I ) ELSE
 IF :WHICH = 7 MAKE "SECOND ( WORD "G "E "R ) ELSE
 IF :WHICH = 8 MAKE "SECOND ( WORD "G "E "R "D ) ELSE
 IF :WHICH = 9 MAKE "SECOND ( WORD "G "I "R ) ELSE
 IF :WHICH = 10 MAKE "SECOND ( WORD "G "I "D ) ELSE
 IF :WHICH = 11 MAKE "SECOND ( WORD "G "E "I "R ) ELSE
 IF :WHICH = 12 MAKE "SECOND ( WORD "G "E "I "R "D )
 PRINTER :SECOND
END

TO PRINTER :SECOND
 MAKE "FIRST CHAR 9
 MAKE "THIRD CHAR 13
 OUTDEV 1
 PRINT1 ( WORD :FIRST :SECOND :THIRD )
 OUTDEV 0
END
```

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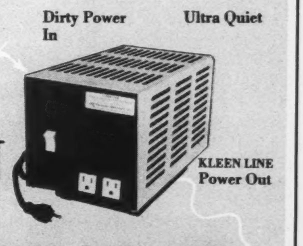

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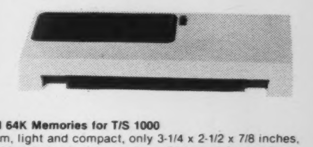

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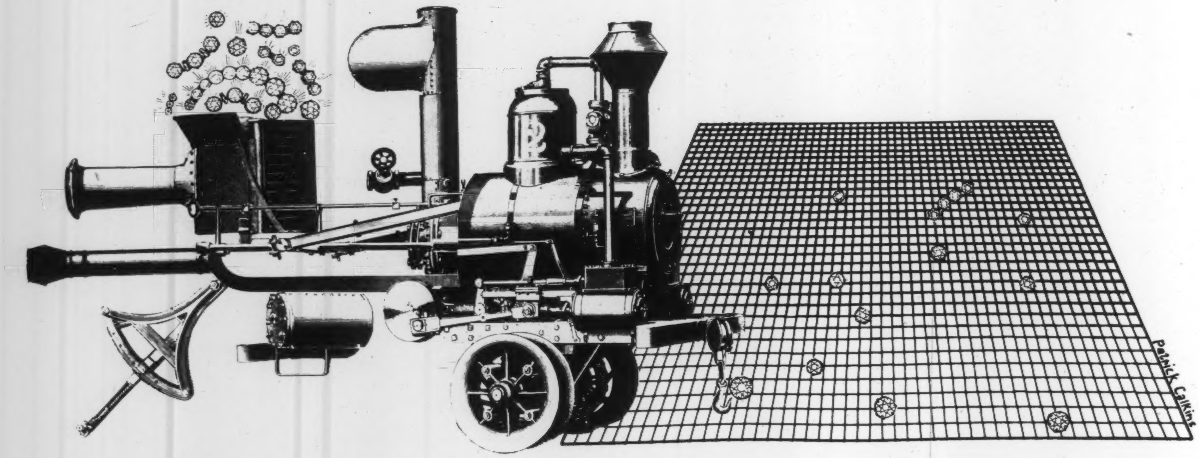
A Strategy Game For Atari

Mercury Mine



Sol Guber

In the August, 1982 issue of *Creative Computing*, Mac Oglesby published a game called 'Droids for the Pet. I have taken the idea and modified the game for use on the Atari system. It is an educational game for fifth and sixth graders. My modification, Mercury Mine, includes an option to play using a joystick and an option to play against the computer.

Let me explain the game briefly. The screen display is a field of diamonds on which are four robots represented by the numbers 1, 2, 3, and 4. Any robot can pick up diamonds for any player.

The players (up to four) take turns moving the robot of their choice. You get one point for each diamond picked up, and the high score wins. The robots move in the eight directions shown on the right side of the screen. Figure 1 shows a typical start of the game. The robots begin at random locations in the field of diamonds so every game is different.

If you want the computer to play in a multiplayer game, type COMPUTER when the game asks for the name of a player.

To play the game, each person must choose which robot he wishes to mine diamonds for him. After the choice is made, he must choose which direction the robot is to go. The robot will continue in that direction until he can pick no more diamonds, that is until he encounters a blank in the field, a boundary, or another robot.

The object is to pick up the largest number of diamonds possible without giving the next person a better move than you have had. This is what makes the game fun. With four people playing, it is very hard to set yourself up for a good move because someone else will probably take advantage of the situation before it is your turn again. It is, however, possible to have teams.

The computer, when it is playing, will always pick the next best move. It will pick up as many diamonds as possible, but it does not check more than one move ahead, so it may make a foolish move that will set the next person up for an excellent move.

When the joystick option is selected, the joystick must be plugged into port 1. There is no provision for use of more than one joystick. When the joystick option is used, a black square appears on the robot numbers on the right side of the screen. The player moves the square to the appropriate robot number by moving the joystick. Pressing the trigger chooses the robots to be used in that turn.

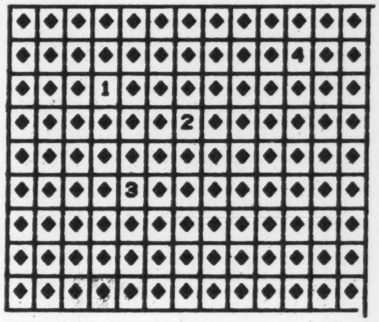
After a short pause, the choice is written on the bottom of the screen. A pink square then appears on the directions on the right side of the screen. As the joystick is moved, the square rotates over the directions possible for motion. When the pink square is on the direction in which you wish the robot to move, the trigger is pressed.

The direction is then written at the bottom of the screen, and the robot moves in that direction, mining the diamonds until he can go no further, at which point the score is updated.

Commands can also be entered from the keyboard. When the name of the player appears, he enters the number of the robot he wishes to use and the initials of the direction in which he wants him to travel.

Sol Guber, 717 Elkington, Olivette, MO 63132.

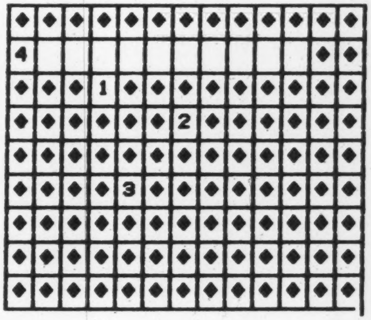
Figure 1.



Sample Game

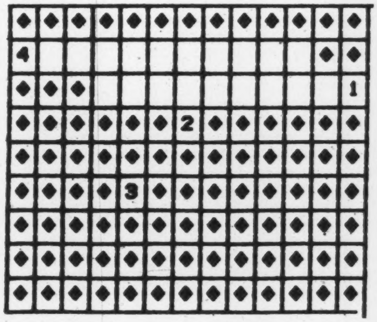
Looking at Figure 1, let us assume that there is a game in progress between Rebecca and the computer, with the computer going first. He has chosen robot 4 to go west. After his move the board will appear as in Figure 2. Rebecca can then move any of the four robots, even 4. She moves robot 1 east, picking up nine diamonds. The score is computer 10, Rebecca 9. The screen appears as in Figure 3.

Figure 2.



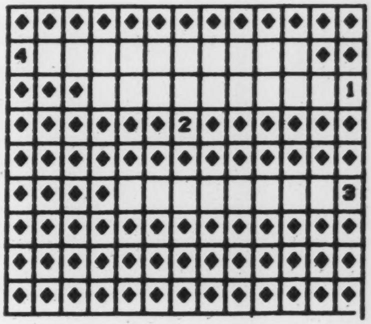
On the next move, the computer moves robot 3 east (Figure 4), and Rebecca has the choice of moving robot 4 south to pick up seven diamonds or robot 2 east to pick up six. If she moves robot 4, the computer will have a very good move with robot 4 east. If she moves robot 2 east, then on the next move, the computer will move robot 4 south, and give Rebecca a good move. She moves robot 2 east. The score is now computer 18, Rebecca 15 (Figure 5).

Figure 3.



On the next move, the computer robot 4 south (Figure 6), and Rebecca moves robot 4 east. The score is now computer 25, Rebecca 26 (Figure 7). A good move for the computer is robot 1 north, which gives a very good move for Rebecca with robot 1 west. Thus with clever play against the computer, Rebecca has pulled ahead and may win the game.

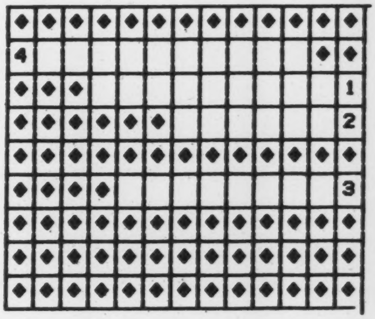
Figure 4.



The Program

I have used player/missile graphics to make the little square move and devised a simple "artificial intelligence" routine to let the computer determine the best move for itself. The routine is in lines 9000-9200. It scans the eight possible directions for each of the four robots and determines the largest number of diamonds to be picked. This is a simple routine that will find only the current best path. Since the search for the best path is only one level deep, it is possible for a child to beat the computer if he can do a two-level search.

Figure 5.



The explanation of the player/missile graphics is more complicated. The program is written in graphics mode 0. One color is allowed, and the letters can be highlighted against the background. To use other colors, a player/missile system must be set up. (This corresponds to sprites on some other systems.) The players can be seen against the background, and can have an independent "life" in relation to the screen.

Figure 6.

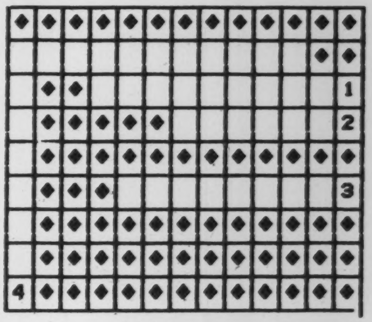
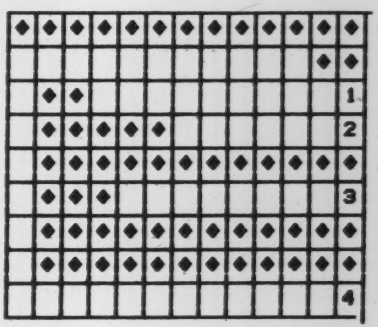


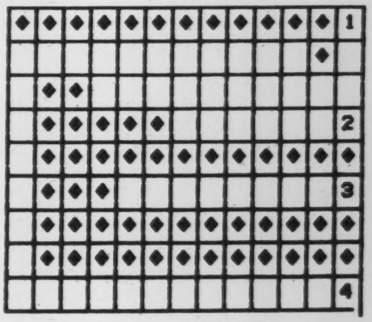
Figure 7.



The players can be moved rapidly in a horizontal direction by changing only one memory location by means of a POKE statement. To move a player vertically is slower, but there is a method that allows the system to do the work for you. This is set up at the beginning of the program in lines 1-50.

Lines 1-50 set up a player/missile area

Figure 8.



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Mercury Mine, continued...

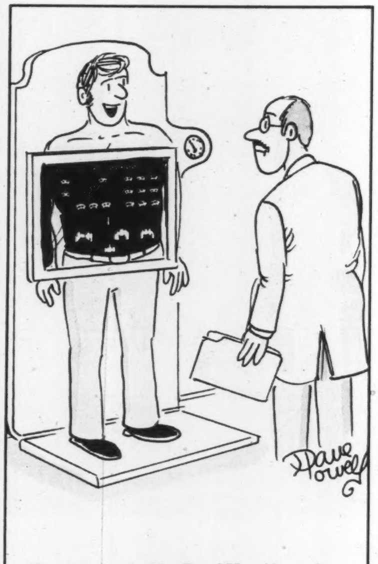
and enable the graphics in the normal manner. The area in memory used for the player/missile area is doing double duty; it serves as the player/missile area and also as the area in memory for storage of a string variable. To fool the system into using this area for two things at once, several things must be done.

Memory locations 134 and 135 are the pointer to memory where string variables are stored. Locations 140 and 141 are the pointer to the actual data storage location. The first dimensioned variable in the program must be a string variable. The system allocates memory for it and puts it into the string variable table.

The memory needed for the player/missile graphics is then calculated, and its location determined. This memory location is transformed into a hi and low address part and is stored in the variable table. Thus, when A$ is used in the program, the actual data are stored in the missile graphics area, and the changes are transformed into pictures on the screen. Since there are four players available, each with its own color or shape, much more information can be put on the screen.

Once the players are set in memory, it is a simple job to move them onto the visible part of the screen. It is also easy to move them up or down by use of the string variable as in line 6700, which moves the square down the screen (up in memory).

To fit the game into 16K, delete lines 3500-3700 and line 3000. ☐



"That's remarkable, Doc! How'd you know I'm a videogame enthusiast?..."

Listing.

```
1 GRAPHICS 0
5 DIM A$(512),B$(20)
7 X=X+1:READ A:IF A<>-1 THEN B$(X,X)=CHR$(A):GOTO 7
9 DATA 0,250,250,250,250,250,250,250,250,250,250,0,-1
12 POKE 559,62:POKE 704,0:POKE 705,84
15 I=PEEK(106)-16:POKE 54279,I
18 POKE 53277,3
20 VTAB=PEEK(134)+256*PEEK(135)
22 ATAB=PEEK(140)+256*PEEK(141)
24 OFFS=I*256+1024-ATAB
26 HI=INT(OFFS/256):LO=OFFS-HI*256
28 POKE VTAB+2,LO:POKE VTAB+3,HI
30 Y=60:Z=100:V=1:H=1
33 A$(Y,Y+11)=B$:POKE 53248,Z
38 IF Y>213 OR Y<33 THEN V=-V
40 HOR=53248:PRIOR=623
42 POKE HOR,220:A$(213,224)=B$:POKE HOR+1,220
70 DIM B1$(40),C$(5),C(4,2),CR$(11),D$(10),SC(4),E$(40),A1$(40),FAC$(20)
72 SIZEPO=53256
73 CHAR=1000:MINE=2000:START=3000:INSTR=4000:SCORE=2520:CLINK=5000:AI=9000
75 CR$="1234EWNS":FAC$="N NEE SES SWW NW":DIM FC$(25),FIN$(4),POT(8):FIN$="1234"
76 FC$="NW W SW N   S NE E SE"
78 B1$(1)=" ":B1$(40)=" ":B1$(2)=B1$
80 FOR I=1 TO 4:SC(I)=0:NEXT I
82 GOSUB 600
85 GOSUB START
88 GOSUB MINE
92 SC=PEEK(88)+256*PEEK(89)
95 POKE 703,4
100 FOR I=1 TO P5:IF B1$((I-1)*10+1,(I-1)*10+8)="COMPUTER" THEN GOTO AI
110 ? "}WHAT IS THE MOVE FOR ";B1$((I-1)*10+1,(I-1)*10+9)
115 IF FG1=1 THEN GOTO 6000
120 ? "WHAT IS THE ROBOT NUMBER";:INPUT D$
130 FLG=0:FOR K=1 TO 4:IF D$(1,1)=CR$(K,K) THEN R=K:FLG=1
140 NEXT K
150 IF FLG=0 THEN ? "THE ROBOT NAME MUST BE FIRST":GOTO 110
160 ? "WHAT IS THE ROBOT DIRECTION";:INPUT C$:C$(LEN(C$)+1)="    "
170 XDIR=0:YDIR=XDIR
190 IF C$(1,1)="S" OR C$(2,2)="S" THEN YDIR=+2
200 IF C$(1,1)="N" OR C$(2,2)="N" THEN YDIR=-2
210 IF C$(1,1)="E" OR C$(2,2)="E" THEN XDIR=+2
220 IF C$(1,1)="W" OR C$(2,2)="W" THEN XDIR=-2
230 IF XDIR=0 AND YDIR=0 THEN 160
240 NUG=0:Y=C(R,1):X=C(R,2)
245 X=X+XDIR:Y=Y+YDIR
250 Z=PEEK(SC+(Y)*40+X+1):IF Z<>96 THEN 300
260 NUG=NUG+1:GOSUB CLINK:POKE SC+(Y-YDIR)*40+(X+1-XDIR),0
265 POKE SC+Y*40+X+1,R+16
270 C(R,1)=Y:C(R,2)=X:GOTO 245
300 SC(I)=SC(I)+NUG
310 GOSUB 2700
320 IF SC(1)+SC(2)+SC(3)+SC(4)>60 THEN GOSUB 4000
500 NEXT I
510 GOTO 100
600 RESTORE 620
610 FOR I=1 TO 8:READ ER:POT(I)=ER:NEXT I:RETURN
620 DATA -82,-80,-78,-2,2,78,80,82
900 TOP=SC(1):WIN=1
910 FOR I=2 TO 4:IF TOP<SC(I) THEN TOP=SC(I):WIN=I
920 NEXT I
930 ? "THE WINNER IS ":B1$((WIN-1)*10+1.(WIN)*10)
980 FOR I=1 TO 1000:NEXT I
985 ? "}DO YOU WANT TO PLAY AGAIN":INPUT B1$:IF B1$(1,1)<>"Y" THEN END
990 GOTO 85
2000 REM
2001 ? "}":POKE 752,1
2010 REM CANNOT BE PRINTED USING MY PRINTER
2020 ? A$
2030 REM CANNOT BE PRINTED USING MY PRINTER
2035 REM CANNOT BE PRINTED USING MY PRINTER
2040 FOR I=1 TO 9:? A$:? E$:NEXT I
2050 REM CANNOT BE PRINTED USING MY PRINTER
2060 ? A$
2070 POSITION 31,2:? "NW N NE"
2080 POSITION 31,3:? "  |"
2090 POSITION 31,4:? "W * E"
2100 POSITION 31,5:? "  | "
2110 POSITION 31,6:? "SW S SE"
2115 POSITION 31,9:? "1 2 3 4"
2118 POSITION 33,11:? "SCORE"
2120 FOR I=1 TO P5
2130 POSITION 30,10+2*I:? B1$((I-1)*10+1,(I-1)*10+9)
2140 POSITION 30,11+2*I:? INT(SC(I)):NEXT I
2190 FOR I=1 TO 4
2200 POSITION C(I,2)+1,C(I,1):? CR$(I,I)
2210 NEXT I
2250 RETURN
2700 FOR N1=1 TO P5
2710 SPOT=SC+(11+2*N1)*40+30
2715 SN1=INT(SC(N1)/10)
2718 IF SN1=0 THEN POKE SPOT,0:GOTO 2730
2720 POKE SPOT,SN1+16
```

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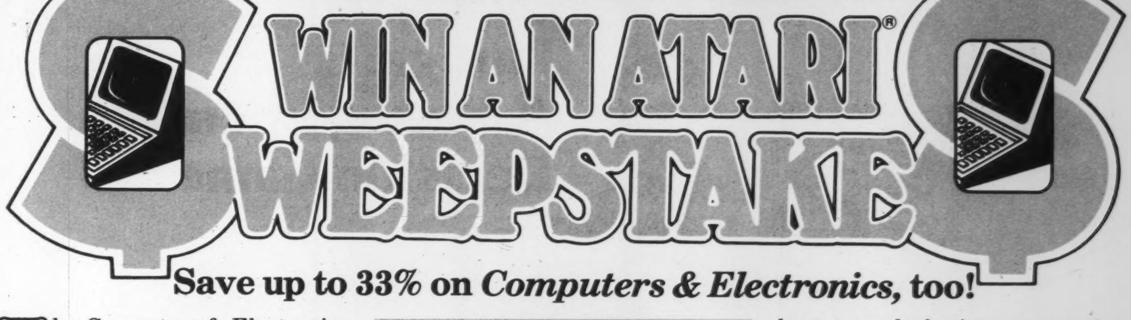
Mercury Mine, continued...

```
2730 POKE SPOT+1,INT(SC(N1)-SN1*10)+16
2740 NEXT N1:RETURN
2818 IF SN1=0 THEN 2730
3000 ? "}DO YOU WANT INSTRUCTIONS":INPUT C$
3010 IF C$(1,1)="Y" THEN GOSUB 3500
3020 ? "}":? "HOW MANY PLAYERS WILL THERE BE         UP TO 4";:INPUT P5
3025 IF P5>1 THEN 3060
3028 P5=2
3030 ? :? "DO YOU WANT TO GO GO FIRST AGAINST    THE COMPUTER";:INPUT C$
3040 IF C$(1,1)="Y" THEN ? :? "WHAT IS YOUR NAME";:INPUT D$:B1$(1,9)=D$:B1$(11,1
9)="COMPUTER":GOTO 3090
3050 IF C$(1,1)="N" THEN B1$(1,9)="COMPUTER":? :? "WHAT IS YOUR NAME";:INPUT D$:
B1$(11,19)=D$:GOTO 3100
3060 FOR I=1 TO P5:? :? "WHAT IS THE NAME OF PLAYER ";I;" :";:INPUT D$
3070 B1$((I-1)*10+1,(I-1)*10+9)=D$:NEXT I
3090 FG1=0:? :? "DO YOU WANT TO USE THE JOYSTICK":INPUT D$:IF D$(1,1)="Y" THEN F
G1=1
3100 FOR I=1 TO 4
3110 X=INT(RND(0)*9+1):Y=INT(RND(0)*13+1):X=X*2:Y=Y*2
3120 IF I=1 THEN 3160
3130 FOR J=1 TO I-1:IF X=C(J,1) AND Y=C(J,2) THEN 3180
3140 NEXT J:C(J,1)=X:C(J,2)=Y
3160 C(I,1)=X:C(I,2)=Y
3180 NEXT I
3220 RETURN
3500 ? "THERE ARE FOUR ROBOTS WORKING IN A    MINE IN THE PLANET MERCURY.  THEY
ARE CALLED 1, 2, 3, AND 4."
3510 ? "AS THEY MOVE, THEY PICK UP DIAMONDS.  YOU CAN TELL ONE ROBOT TO MOVE AND
"
3520 ? "PICK UP THE DIAMONDS IN HIS PATH UNTILTHERE ARE NO MORE DIAMONDS IN HIS
WAY."
3530 ? "YOU MUST TELL THE ROBOT WHICH DIREC-  TION TO MOVE.  THE PERSON WITH THE
    MOST DIAMONDS WINS."
3540 ? :? "DO YOU WISH TO SEE THE BOARD":INPUT D$
3560 IF D$(1,1)="Y" THEN GOSUB 3100:GOSUB 2000:POSITION 1.23:? "PRESS RETURN TO
CONTINUE":INPUT D$
3580 ? "TO MOVE A ROBOT, TYPE ITS NUMBER AND  THEN TYPE THE DIRECTION THE ROBOT
IS  TO GO TO."
3590 ? "USING THE JOYSTICK, MOVE THE JOYSTICK UNTIL THE SQUARE IS ON THE ROBOT O
R   DIRECTION WANTED.  THEN PRESS"
3595 ? "THE TRIGGER.  THE CHOICE WILL STAY ON THE SCREEN"
3600 ? :? "PRESS RETURN TO CONTINUE":INPUT D$
3700 RETURN
4000 FOR REL=1 TO 4
4005 IF VAL(FIN$(REL,REL))=0 THEN 4500
4010 X=C(REL,2):Y=C(REL,1)
4320 OT=SC+Y*40+X+1:MOV=0
4340 FOR KK=1 TO 8:IF PEEK(OT+POT(KK))=96 THEN MOV=1:GOTO 4355
4350 NEXT KK
4353 IF MOV=0 THEN FIN$(REL,REL)="0"
4355 IF VAL(FIN$)=0 THEN GOTO 900
4500 NEXT REL:RETURN
5000 FOR LM=1 TO 6:FOR KM=65 TO 35 STEP -3:SOUND 0,KM,10,10:NEXT KM:NEXT LM:SOUN
D 0,0,0,0:RETURN
6000 A$(1)="":A$(512)="":A$(2)=A$
6003 ? "THE ROBOT NUMBER IS ";
6005 POS=8:Y=101:POKE HOR,171:A$(Y,Y+11)=B$:HR=171
6010 IF STICK(0)<>15 THEN HR=HR+8:POKE HOR,HR:IF HR>195 THEN HR=171:POKE HOR,HR
6013 FOR J=1 TO 50:NEXT J
6020 IF STRIG(0)=1 THEN 6010
6030 R=INT((HR-171)/8)+1:? R
6035 ? "THE DIRECTION IS ";
6038 FOR M=1 TO 100:NEXT M
6050 Y=304:POKE HOR+1,171:HR=171:A$(Y,Y+11)=B$
6060 IF STICK(0)<>15 THEN POS=POS+1:IF POS<9 THEN GOSUB 6500
6062 IF POS>8 THEN POS=1:GOSUB 6500
6068 FOR M=1 TO 25:NEXT M
6070 IF STRIG(0)=1 THEN 6060
6080 C$(1,2)=FAC$(POS*2-1,POS*2):? C$(1,2):GOTO 170
6500 POKE SIZEPO+1,0:IF INT(POS/2)=POS/2 THEN POKE SIZEPO+1,1
6520 ON INT((POS+1)/2) GOTO 6600,6700,6800,6900
6600 HR=HR+12:POKE HOR+1,HR:FOR M=1 TO 25:NEXT M:RETURN
6700 FOR M=Y TO Y+16:A$(M,M+11)=B$:NEXT M:Y=Y+16:RETURN
6800 HR=HR-12:POKE HOR+1,HR:FOR M=1 TO 25:NEXT M:RETURN
6900 FOR M=Y TO Y-16 STEP -1:A$(M,M+11)=B$:NEXT M:Y=Y-16:RETURN
9000 MAX=0
9005 ? "}THE MOVE FOR COMPUTER "
9010 FOR II=1 TO 4:POS=0
9030 FOR XDIF=-2 TO 2 STEP 2
9040 FOR YDIF=-2 TO 2 STEP 2:CNT=0:POS=POS+1
9043 X=C(II,2):Y=C(II,1)
9050 X=X+XDIF:Y=YDIF+Y
9060 OS=SC+Y*40+X+1
9065 IF PEEK(OS)<>96 THEN 9100
9070 CNT=CNT+1:GOTO 9050
9100 IF MAX<CNT THEN MAX=CNT:IB=II:XB=XDIF:YB=YDIF:PS=POS
9110 NEXT YDIF:NEXT XDIF:NEXT II
9120 XDIR=XB:YDIR=YB:R=IB
9122 ? "THE ROBOT NUMBER IS ";R
9124 ? "THE ROBOT DIRECTION IS ";FC$(PS*2-1,PS*2)
9130 GOTO 240
```

COMPUTERS & ELECTRONICS



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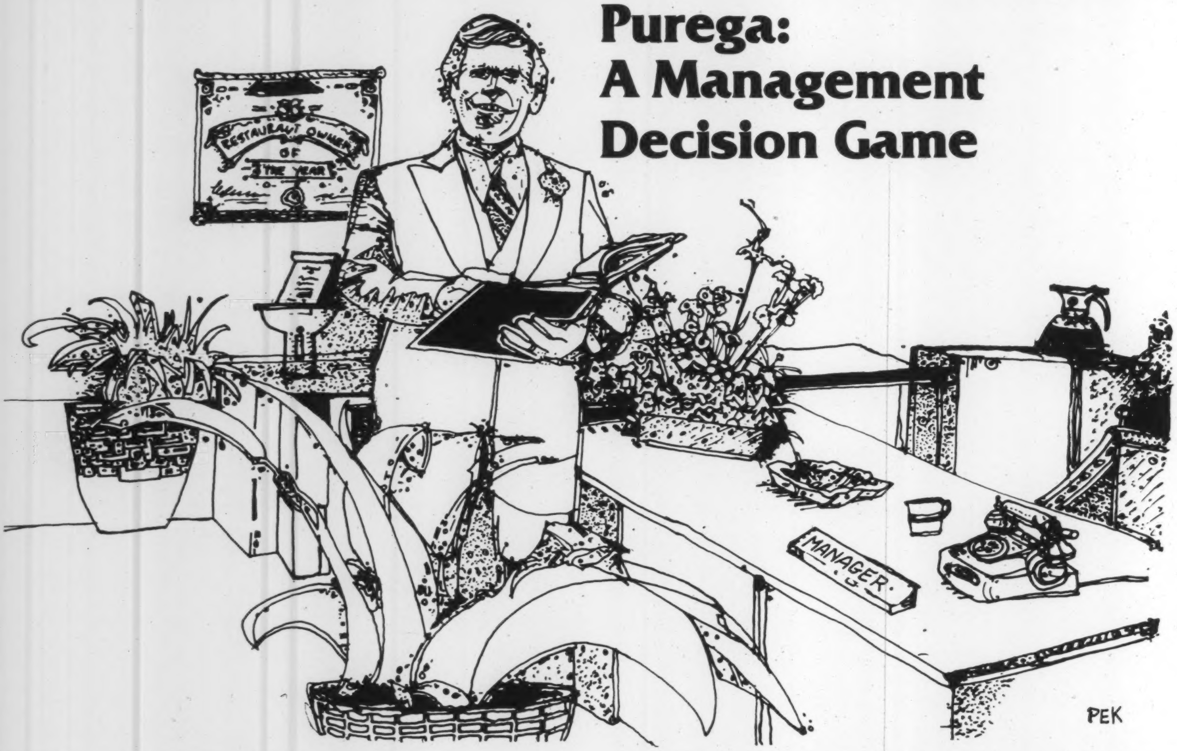
Purega: A Management Decision Game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John R. Rousselle

Purega allows the player to be the manager of a 200-seat restaurant. The manager's goal is to maximize profits by properly managing his marketing effort and human resources. He makes up to eight decisions each month dealing with these two aspects of management. In addition, he must decide how much to spend on preventive maintenance.

This game was designed to give students a taste of management decision making, a particularly important and difficult area for management educators to teach. It is currently used by several college hospitality education programs around the country.

After the player has made his decisions, he gets a Sales Summary outlining the success of that month's advertising and promotion. In addition, the summary shows six other things. First, it shows if any sales have accrued this month from the previous month; the amount appears under the Residual heading. Second, the report shows whether any sales have accrued from excess demand in the previous month—Sales Gained By Last Month's Ex Demand. (The restaurant can handle no more than $100,000 per month.)

Third, it shows whether any sales were lost because of bad will generated from the previous month—Sales Lost Last Month's Turnaway. Bad will exists where there is not enough manpower to handle the demand or the total of excess demand carried over from the previous month totals or $100,000—whichever is lower.

Fourth, the report shows Total Demand generated for the month. Fifth, it shows if more demand is generated than the restaurant can handle, and sixth, it shows whether sales were lost due to insufficient manpower to meet the Total Demand (up to $100,000). It also shows which position caused the problem—waitressess, cooks, dishmen.

Purega next provides the Profit and Loss Statement and a Labor Force at Month's End statement for the month based upon the player's decisions and assumptions within the program. The program also offers the player an opportunity to see year-to-date figures after each month.

Limits are placed on how much training can be given each employee, how much one can spend on preventive maintenance, advertising, and promotion. These measures, along with the basic assumptions within Purega, are designed to ensure that the results are realistic. Our experience to date suggests that the results of the simulation are consistent with the recent operating results for restaurants of this size.

Although Purega was written for students of hospitality management, the basic concepts are simple enough to be understood by anyone. It may be a nice change of pace after a hard day fighting aliens and slaying dragons. However, the simulation is not a simple one to master.

Most players get fired the first few times they play Purega. (After six months the Board of Directors looks at the profitability of the operation and fires the manager if it is too low.) It is important to note that this is not caused by any tricks hidden in the program. The algorithm is straightforward and will generally yield good results if prudent decisions are made. However, strategic placement of the RND (random number generator) command will prevent the simulation from giving identical results if identical decisions are made throughout the

---

John R. Rousselle, Department of Restaurant, Hotel and Institutional Management, Purdue University, West Lafayette, IN 49707.

year. This is certainly consistent with the real world of restaurant management.

In its present form, the program will yield identical results if identical decisions are entered. This may be helpful for those who are interested in Purega as an educational tool and who need to be able to explain results to student users. However, recreational users may want to insert RANDOMIZE, or some similar command, somewhere before line 420 to generate unique results for each new year.

The code is written in Basic-Plus to run on a DEC RSTS-E system.

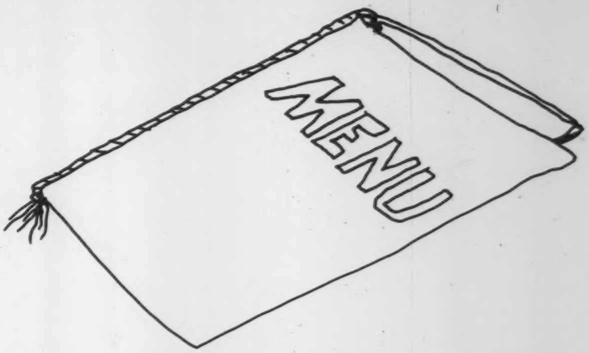
Playing the Game

You are the new manager of the Purega Restaurant, an established tableservice restaurant that caters to the middle and upper middle class.

As manager, you are responsible to a Board of Directors that is very concerned with the sales and profitability of the restaurant. They are also very concerned with the human relations aspect of the business, so they will be looking at your turnover rate.

Your specific duties are to make nine decisions each month.

1. Advertising: How much to spend.
2. Promotion: How much to spend.



You may spend as much as you wish on each of these. However, your annual limit is $20,000. Moreover, you should realize that the restaurant has the capacity to handle only $100,000 in sales per month. Therefore, even though you may generate a sales demand of $300,000, your sales can be no more than $100,000. Advertising includes radio, newspaper, and TV. Promotion includes coupons and special prices. Each can affect sales differently each month. Furthermore, although a promo-

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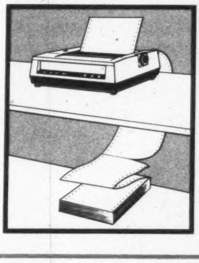

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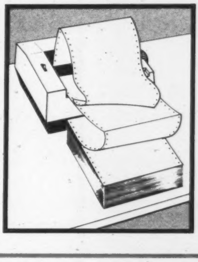

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CIRCLE 205 ON READER SERVICE CARD

tion will affect only one month's sales, advertising expense for one month can affect sales in the next month. This effect is noted as Residual in the monthly report:

3. New waitresses: How many to hire.
4. Waitress training: How many hours of training for each one. Maximum of 16 hours.
5. Cooks: How many to hire.
6. Cook training: How many hours for each one. Maximum of 40 hours.
7. Dishmen (DMO): How many to hire.
8. Dishmen training: How many hours for each one. Maximum of 8 hours.

Sales can also be limited by not having enough trained personnel in each position. Each month you must decide how many new people to hire for each position and how many hours of training to give each one. Training costs are $3.00, $8.00, and $4.65 per hour for each waitress, cook, and dishman respectively. These costs are based on hourly wages of $2.25, $6.00, and $3.50 plus the loss in the training employee's productivity. The new employee works with an experienced employee for the duration of his training. This system reduces the productivity of the trainer by 33%, so that cost must be added to the cost of training.

Obviously, the less experienced a new employee is, the fewer sales he can handle. The maximum sales that can be handled by each trained waitress, cook and dishman are: $4000, $16,000,

Variables

A	Amount remaining for advertising and promotion
A5	Current month's advertising result
A6	Residual from last month's advertising
C	Cook manpower
C1	Cooks hired or fired
C2	Cooks available to work
C3	Cook turnover in month
C4	Cook turnover percent
C5	Cook sales limit
C6	Year-to-date cook turnover
C7	Year-to-date cooks on staff
C8	Year-to-date cook turnover percent
D	Dishmen manpower
D1	Dishmen hired or fired
D2	Dishmen available to work
D3	Dishmen turnover in month
D4	Dishmen turnover percent
D5	Dishmen sales limit
D6	Year-to-date dishmen lost
D7	Year-to-date dishmen on staff
D8	Year-to-date dishmen turnover percent
D9	Excess demand
E1	Month's training expense
E2	Personnel administration cost
E3	Month's labor cost
E4	Month's food cost
E5	Month's miscellaneous cost
E6	Month's fixed cost
E7	Month's preventive maintenance cost
E8	Month's repair cost
E9	Month's advertising expense
E$	Employee category with lowest sales capacity
E1$	"In sales lost due to not enough"
E2$	"Too many waitresses for business"
F1	Total controllable expenses
K	Counter
L1	Sales lost
L5	Result of turnaway
L6	Year-to-date turnaway
L7	Year-to-date sales lost
M	Month
M5	Year-to-date miscellaneous cost
P	Month promotion expense
P1	Year-to-date training cost
P2	Year-to-date personnel administration cost
P3	Year-to-date labor cost
P4	Year-to-date food cost
P5	Result for month promotion
P6	Year-to-date fixed cost
P7	Year-to-date preventive maintenance cost
P8	Year-to-date repair cost
P9	Year-to-date advertising expense
Q1	Year-to-date promotion expense
!2	Year-to-date controllable expenses
R1	Excess demand result
R5	Random effect on sales
S	Sales potential
S2	Total demand
S5	Month's sales
T1	Waitress training hours
T2	Cooks training hours
T3	Dishmen training hours
T4	Month's profit or loss
T5	Year-to-date profit or loss
T6	Year-to-date sales
W	Waitress manpower
W1	Waitresses hired or fired
W2	Waitresses available to work
W3	Waitress turnover in month
W4	Waitress turnover percent
W5	Sales limit
W6	Year-to-date waitress turnover
W7	Year-to-date waitresses on staff
W8	Year-to-date waitress turnover percent
W9	Manager's wage

The Program

Lines	Explanation
10-90	Heading and initialization
100-410	Decision sequence
420-510	Generation of sales potential
520-760	Analysis of manpower, capacity, sales potential, and determination of actual sales
770-980	Determine month's turnover and end of month staff
990-1030	Determine repair cost
1040	Begin output sequence
1050-1080	Format statements
1090-1310	Output Sales Summary
1320-1550	Calculate cost
1560-1670	Format statements
1680-1990	Output month's profit and loss statement
2000-2030	Output end of month manpower
2040-2130	Firing sequence
2150	End of year check
2160-2620	Year-to-date information
2630	End of year check
2640-2650	Fired manager check
2660-2710	Format statements
2720-2860	Manager's salary sequence
2870-2880	Continue game check

and $12,000 respectively. This is based on an eight-hour work day, 20-day work month, and $25, $100, $75 sales per hour respectively.

Although a waitress can generate $4,000 per month, this level of productivity requires that she work at 100% of her ability each hour of the day. There is a certain amount of turnover each month. However, the harder she must work, the more likely she is to quit. The same holds for the cooks and dishmen.

Since the waitresses rely on tips, you must be careful not to have too many. If there are too many, their individual tips will be low, and they may quit. Cooks and dishmen are paid by the hour, so this is not a problem for them.

Each time you hire someone there is an administrative cost of $50. Everyone hired must be paid his full wage. Employees may be fired by typing a minus before the number to be terminated when you are asked how many to hire the next month. You will be charged a $50 administrative cost for each fired employee.

9. Preventive Maintenance.

You may spend up to $50 per month on preventive maintenance. This will not guarantee that equipment will not break down, but it may reduce your cost.

The last manager quit and took all of the records. The sales last year averaged about $70,000 per month, and the Board thinks sales were fairly stable. The Board also thinks that the last manager spent about $700 a month for advertising and promotions, but they are not sure.

You will be paid a salary of $20,000 and receive a bonus of .25% of all sales and 5% of profits. However, you will lose 10% on all sales lost due to lack of manpower.

You have a one-year contract that may be renewed at the discretion of the Board of Directors. ☐

Listing.

```
10 PRINT CHR$(12) \ PRINT TAB(34); "P U R E G A "\PRINT\PRINT\PRINT\PRINT
20  PRINT TAB(33); " written by "
30  PRINT TAB(22); " Department of Restaurant, Hotel,"
40  PRINT TAB(25) ;"and Institutional Management"
50  PRINT TAB(31) ; "Purdue University"
60  PRINT\PRINT\PRINT\PRINT
70 DIM E9(15),E7(15),D9(15)
80 DIM E1$(12),E2$(12),L1(15)
90 LET W2=15 \ C2=5 \ D2=8 \ K=3  \ M=0\A=20000
100 PRINT\PRINT\PRINT\ M=M+1 \ K = K+1 \T1=0\T2=0\T3=0
110 PRINT "DECISIONS FOR MONTH"; M \PRINT
120  PRINT " You have $"; A;" available for advertising and promotion"
130 PRINT
140 INPUT "ADVERTISING";E9(K)
150 IF E9(K)<0 THEN E9(K)=0
160   IF E9(K)>A THEN PRINT "YOU SPENT TOO MUCH!  YOU HAVE$"; A\GO TO 140
170  LET A=A-E9(K)
180 INPUT "PROMOTION";P
190 IF P<0 THEN P=0
200  IF P>A THEN PRINT "YOU SPENT TOO MUCH! YOU HAVE $";A \GO TO 180
210 LET A=A-P
220 PRINT"WAITRESSES. YOU NOW HAVE ";W2;
230 INPUT W1
240  IF(W1+W2)<=0 THEN PRINT "YOU FIRED TOO MANY!"\GO TO 220
250  IF W1<=0 THEN GO TO 280
260 INPUT "WAITRESS TRAINING (HRS PER WAITRESSES)";T1
270  IF T1>16 THEN PRINT "THAT IS TOO MANY!"\GO TO 260
280 PRINT"COOKS. YOU NOW HAVE ";C2;
290 INPUT C1
300  IF (C1+C2)<=0 THEN PRINT "YOU FIRED TOO MANY!"\GO TO 280
310  IF C1<=0 THEN GO TO 340
320 INPUT "COOK TRAINING (HRS PER COOK)";T2
330  IF T2>40 THEN PRINT "THAT IS TOO MANY!"\GO TO 320
340 PRINT"DMOS. YOU NOW HAVE ";D2;
350 INPUT D1
360  IF (D1+D2)<=0 THEN PRINT "YOU FIRED TOO MANY!"\GO TO 340
370  IF D1<=0 THEN GO TO 400
380 INPUT "DMO TRAINING (HRS PER DMO)"; T3
390  IF T3>8 THEN PRINT "THAT IS TOO MANY!"\GO TO 380
400 INPUT "PREVENTIVE MAINTENANCE (UP TO 50)";E7(K)
410 IF E7(K) >50 THEN PRINT "THAT'S TOO MUCH."\ GOTO 400
420 A5 = INT(E9(K)*35*RND)      !CURRENT AD RESULT
430 A6 = INT(E9(K-1)*8*RND)     ! RES AD EFFECT
440 P5 = INT(P*(15*RND+5))      ! PRO RESULT
450  L5= INT(.5*L1(K-1)*RND)            ! RESULT OF TURNAWAY - INDIRECT
460 IF L5<0 THEN L5=0
470 L6 = L6+L5
480 IF RND>.5 THEN W=-1 ELSE W=1
490 R5 = W*INT(5000*RND)        !RANDOM EFFECT
500 R1 = INT(.4*D9(K-1)*RND)    ! EXCESS DMD RESULT
510 S = 60000+A5+A6+P5+R5+ R1-L5           ! SALES POT************
520 LET S2=S
530 IF S>100000 THEN D9(K)=S-100000
540 IF S>100000 THEN S=100000
550 W = W2+INT((W1*T1)/16)     ! WAIT MANPOWER
560 C = C2+INT((C1*T2)/40)     ! COOK MANPOWER
570 D = D2+INT((D1*T3)/8)       !DMO MANPOWER
580 W2 = W2+W1                  ! NO WAITRESS
590 W7 =W7+W2
600 C2 = C2+C1                  ! NO COOKS
610 C7 = C7+C2
620 D2 = D2+D1                  ! NO DMO S
630 D7 = D7+D2
640 W5 = W*4000                 ! SALES LIMIT FOR WAIT
650 C5 = C*16000                ! SALES LIMIT FOR COOKS
660 D5 = D*12000                ! SALES LIMIT FOR DMO S
```

Purega, continued...

```
670 IF W5<=C5 AND W5<=D5 THEN S1=W5 \E$= 'WAITRESSES' \L1(K)=S-W5 \ GOTO 700
680 IF C5<=W5 AND C5<=D5 THEN S1=C5 \E$= 'COOKS' \ L1(K)=S-C5 \ GOTO 700
690 LET S1=D5 \ E$='DMOS' \ L1(K)=S-D5  ! LAST 3 LINES CAL MANPOWER SALES LIM
700 IF L1(K)>0 THEN L7=L7+L1(K)          ! YTD SALES LOST
710 REM ********DETERMINE MONTHLY SALES*****
720 IF S1<S THEN S5=S1 ELSE GO TO 750
730 E1$(M)= ' IN SALES LOST DUE TO NOT ENOUGH '
740  GO TO 760
750 LET S5=S
760 IF S2>100000 AND S1>100000 THEN D9(K)=S2-100000
770 REM **********THESE LINES DETERMINE EMPLOYEE LOSS*********
780 IF S/W >3000 THEN GOTO 830
790 W3 = INT(.5+(2300/(S/W))*(.3*W2*RND))        ! WAIT LOST DUE TO LOW TIPS
800 IF W3>INT(.45*W2) THEN W3=INT(.45*W2)
810 E2$(M) = 'TOO MANY WAITRESSES FOR BUSINESS.  TIPS TOO LOW.'
820 GOTO 850
830 W3 = INT(.5+(S/W)/4000 * (.45*W2)*RND)
840 IF W2-W3<1 THEN W3=W2-1
850 W6 = W6+W3
860 C3 = INT(.5+(S/C)/16000 * (.45*C2)*RND)
870 IF C2-C3<1 THEN C3=C2-1
880 C6 = C6+C3
890 D3 = INT(.5+(S/D)/12000 * (.45*D2)*RND)
900 IF D2-D3<1 THEN D3=D2-1
910 D6 = D6+D3
920 W4 = FNR(W3/W2)
930 C4 = FNR (C3/C2)
940 D4 = FNR(C3/D2)
950 REM ********** EMPLOYEE COUNT AT MONTH END*******
960 W2= W2-W3
970 C2= C2-C3
980 D2= D2-D3
990 REM ******REPAIR COST******
1000 IF M*RND<.9 THEN E8=0 \GOTO 1040
1010 E8 = INT((K*75)*RND+((S-70000)*.003)*RND
                -(4*E7(K)+(2*E7(K-1))+(E7(K-2))))
1020 REM ****REPAIR COST BASED OF SALES, TIME, AND PREVENT. MAINT.***
1030 IF E8<0 THEN E8=0
1040 REM******AD&PROMO RESULTS, LABOR SIT. FOR MONTH*******
1050 FMT11$='                  #####         #####'
1060 FMT12$='                 #####        #####'
1070 FMT13$='                    #####'
1080 FMT14$='                            ######'
```

MENU
-PLEASE-
WAIT TO
·BE·
SEATED

SEPTEMBER 6, 1983
MORNING EDITION

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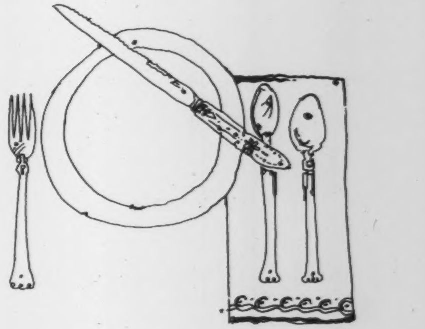
CIRCLE 269 ON READER SERVICE CARD

```
1090 PRINT CHR$(12)
1100 PRINT\PRINT\PRINT,,"MONTH ";M;" RESULTS"
1110 PRINT"************************************************************************"
1120 PRINT\PRINT\PRINT
1130 PRINT,"***SALES SUMMARY***" \PRINT
1140 PRINT "ADVERTISING AND PROMOTION RESULTS" \PRINT
1150 PRINT "  ADVERTISING",,"EXPENSE","SALES"
1160 PRINT USING"    CURRENT" + FMT11$,E9(K),A5
1170 PRINT USING "    RESIDUAL" + FMT12$,E9(K-1),A6
1180 PRINT USING"  PROMOTION" + FMT11$,P,P5
1190 PRINT" SALES GAINED BY"
1200 PRINT USING" LAST MONTH'S EX DEMAND" + FMT13$,R1
1210 PRINT" SALES LOST BY"
1220 PRINT "LAST MONTH'S TURNAWAY",,"<";L5;">"
1230 PRINT
1240 PRINT USING"  TOTAL DEMAND" + FMT14$,S2
1250 PRINT "(INCLUDES NATURAL DEMAND)"
1260 PRINT\PRINT
1270 IF S2-100000<=0 THEN 1300
1280 PRINT "$";S2-100000;" MORE IN DEMAND THAN"
1290 PRINT"THE RESTAURANT CAN HANDLE."
1300 PRINT\ IF E1$(M)<>" " THEN PRINT L1(K);E1$(M);E$;" !!!" \ PRINT CHR$(7)
1310 INPUT "PRESS 'RETURN' TO CONTINUE";Y2$
1320 REM******CALCULATE COST******
1330 E1 = INT((T1*W*2.66)+(T2*C1*8)+(T3*D1*4.65))   !TRAINING
1340 P1 = P1+E1         ! YTD TRAINING
1350 E2 = INT((W1+C1+D1)*50+.5) \ IF E2<0 THEN E2=0                                  ! NEW HIRE
1360 P2 = P2+E2         !YTD NEW HIRE
1370 E3 = INT (5000+(W2*480)+(C2*1120)+(D2*720)+.5)       ! LABOR
1380 P3 = P3+E3                                         ! YTD LABOR
1390 E4 = INT (6000+(S5*.31))                      ! FOOD
1400 P4 = P4+E4                                    ! YTD FOOD
1410 E5 = INT (4000+S5*.06)                        ! MISC CONT
1420 M5 = M5+E5                                    ! YTD MISC CONT
1430 E6 = INT(4000+S5*.01)                         ! FIXED
1440 P6 = P6+E6                                    ! YTD FIXED
1450 E7(K) = E7(K)                                 ! PRE MAIT INPUT
1460 P7 = P7 +E7(K)
1470 E8 = E8                                            ! REPAIR (CAL 225)
1480 P8 = P8+E8                                   ! YTD REPAIR
1490 P9 = P9+E9(K)                                ! YTD ADVER
1500 Q1 = Q1+P                                     ! YTD PROMO
1510 F1 = E1+E2+E3+E4+E5+E7(K)+E8+E9(K)+P          ! TOT CONT EXP
1520 Q5 = Q5+F1                                    ! YTD TOT CONT EXP
1530 T1 = S5-F1-E6                                      ! PROFIT / LOSS
1540 T5 = T5+T1                                        ! YTD P/L
1550 T6 = T6+S5
1560 FMT1$="                #######                      ##.##"
1570 FMT2$="                     #######                      ##.##"
1580 FMT3$= "                    #####                      ##.##"
1590 FMT4$="                       ####                      ##.##"
1600 FMT5$="                 #####                      ##.##"
1610 FMT6$="                  #####                      ##.##"
1620 FMT7$="                      #####                      ##.##"
1630 FMT8$="                ######                     ###.##"
1640 FMT9$="                          ########       ###.##"
1650 FMT10$="                 ####                      ##.##"
1660 FMT15$="                                   #######        ###.##"
1870 FMT16$="                             ######       ###.##"
1680 REM******* MONTHS P/L STATEMENT *******
1690 DEF FNR(A) = INT(A*10^4+.5)/(10^2)
1700 PRINT "*****************" \PRINT\PRINT
1710 Z=100.00
1720  PRINT CHR$(12)
1730 PRINT\PRINT "PROFIT AND LOSS STATEMENT"\PRINT\PRINT
1740  PRINT"                                          TOTAL        PERCENT"
1750 PRINT USING "SALES" + FMT15$,S5,Z
1760 PRINT "EXPENSES"\PRINT
1770 PRINT USING " FOOD & BEV" + FMT1$,E4,FNR(E4/S5)
1780 PRINT USING " LABOR" + FMT2$,E3,FNR(E3/S5)
1790 PRINT USING " TRAINING" + FMT3$,E1,FNR(E1/S5)
1800 PRINT USING " HIRING" + FMT4$,E2,FNR(E2/S5)
1810 PRINT USING " ADVERTISING" + FMT5$,E9(K),FNR(E9(K)/S5)
1820 PRINT USING " PROMOTIONS" + FMT6$,P,FNR(P/S5)
1830 PRINT USING " PREV. MAINT." + FMT10$,E7(K),FNR(E7(K)/S5)
1840 PRINT USING " REPAIR" + FMT7$,E8,FNR(E8/S5)
1850 PRINT USING " MISC. CONT." + FMT8$,E5,FNR(E5/S5)
1860 PRINT
1870 PRINT USING "CONT,. EXPENESE" + FMT9$,F1,FNR(F1/S5)
1880 PRINT
1890 PRINT USING "FIXED EXPENSES" + FMT9$,E6,FNR(E6/S5)
1900 PRINT
1910 PRINT USING "TOTAL EXPENSES" + FMT9$,F1+E6,FNR((F1+E6)/S5)
1920 PRINT TAB(25);"*************************************"
1930  IF T1>=0 THEN GO TO 1960
1940 PRINT\PRINT "PROFIT <LOSS>";
1950 PRINT,,,"< ";T1*-1;" >",FNR((T1*-1)/S5)  \ GOTO 1990
1960 PRINT
1970 PRINT USING "PROFIT <LOSS>" + FMT16$,T1,FNR(T1/S5)
1980 PRINT
1990 INPUT "PRESS 'RETURN' TO CONTINUE";Y2$
```



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CIRCLE 183 ON READER SERVICE CARD

Purega, continued...

```
2000 PRINT\PRINT "******************" .
2010 PRINT\PRINT "LABOR FORCE AT MONTH'S END" \PRINT
2020 IF E2$(M)<>" " THEN PRINT E2$(M) \PRINT
2030 PRINT" WAITRESSES";W2,"COOKS";C2,"DMOS";D2
2040 IF M<>6 THEN 2150
2050 IF T5>1000 THEN 2150
2060 INPUT "PRESS `RETURN` TO CONTINUE";Y2$
2070 PRINT CHR$(12) \ PRINT CHR$(7)
2080 PRINT\PRINT "!!!!!!!!!!!!!!!!!!!!!!"\PRINT
2090 PRINT " THE BOARD OF DIRECTORS HAS DECIDED TO FIRE YOU!!!"
2100 PRINT " A LOSS OF $";-T5; " IN SIX MONTHS IS UNACCEPTABLE."
2110 PRINT " YOU WILL BE PAID THE FULL SALARY BUT DON'T LET THE"
2120 PRINT " DOOR HIT YOU IN THE #?&! WHEN YOU LEAVE." \PRINT
2130 INPUT " PRESS 'RETURN' TO CONTINUE "; Y2$
2140 GOTO 2220
2150  IF M=12 THEN GO TO 2240
2160 INPUT "DO YOU WANT YEAR TO DATE RESULTS ";Y2$
2170  IF LEFT(Y2$,1)<>"Y"  THEN GO TO 100
2180  PRINT CHR$(12)
2190  PRINT , "Y-T-D RESULTS AFTER MONTH";M
2200  PRINT\PRINT
2210  GO TO 2260
2220 REM**********PRINT SUMMARY RESULTS******
2230 Z=100.00
2240   PRINT CHR$(12)
2250 PRINT , "R E S U L T S   F O R   Y E A R" \PRINT\PRINT
2260 PRINT"                                             TOTAL         PERCENT"
2270 PRINT USING  "SALES" + FMT15$,T6,Z
2280 PRINT"EXPENSES" \PRINT
2290 PRINT USING " FOOD & BEV" + FMT1$,P4,FNR(P4/T6)
2300 PRINT USING " LABOR" + FMT2$,P3,FNR(P3/T6)
2310 PRINT USING " TRAINING" + FMT3$,P1,FNR(P1/T6)
2320 PRINT USING " HIRING" + FMT4$,P2,FNR(P2/T6)
2330 PRINT USING " ADVERTISING" + FMT5$,P9,FNR(P9/T6)
2340 PRINT USING " PROMOTIONS" + FMT6$,Q1,FNR(Q1/T6)
2350 PRINT USING " PREV. MAINT." + FMT10$,P7,FNR(P7/T6)
2360 PRINT USING " REPAIR" + FMT7$,P8,FNR(P8/T6)
2370 PRINT USING " MISC. CONT." + FMT8$,M5,FNR(M5/T6)
2380 PRINT
2390 PRINT USING "CONT. EXPENSES" + FMT9$,Q5,FNR(Q5/T6)
2400 PRINT
2410 PRINT USING "FIXED EXPENSES" + FMT9$,P6,FNR(P6/T6)
2420 PRINT
2430 PRINT USING "TOTAL EXPENSES" + FMT9$,Q5+P6,FNR((Q5+P6)/T6)
2440 PRINT TAB(25) "**************************************"
2450 IF T5>=0 THEN GO TO 2480
2460 PRINT\PRINT "PROFIT <LOSS>";
2470 PRINT,,,"< " ;T5*-1;" >" ,FNR(T5/T6)  \ GOTO 2520
2480 PRINT
2490 PRINT USING "PROFIT <LOSS>" + FMT16$,T5,FNR(T5/T6)
2500 PRINT\ INPUT "PRESS 'RETURN' TO CONTINUE";Y2$
2510 REM *****YTD PERSONNEL REPORT:::::
2520 PRINT\PRINT\PRINT "***********************" \PRINT
2530 LET W8 = FNR(W6/(W7/M)) \
         C8 = FNR (C6/(C7/M)) \
          D8 = FNR(D6/(D7/M))
2540 T8 = FNR((W6+C6+D6)/((W7+C7+D7)/M))
2550 PRINT "TURNOVER FOR YEAR" \PRINT
2560 PRINT , "WAITRESSES","COOKS","DMOS","TOTAL"
2570 PRINT "LOST",W6,C6,D6,W6+C6+D6
2580 PRINT "PERCENT",W8,C8,D8,T8
2590 PRINT\PRINT "*********************"\PRINT
2600 PRINT"SALES LOST BY "
2610 PRINT "   TURNAWAY - DIRECT",,"<";L7;">  !!"
2620 PRINT "   TURNAWAY - INDIRECT",,"<";L6;">  !!"
2630  IF M=12 THEN GO TO 2650
2640  IF T5<0 AND M=6 THEN GO TO 2650 ELSE 2870
2650  INPUT "PRESS 'RETURN' TO PICK UP YOUR CHECK";Y2$
2660 FMT17$="       #####.##"
2670 FMT18$="     ####.##"
2680 FMT19$="    ####.##"
2690 FMT20$="     #####.##"
2700 FMT21$="   ####.##"
2710 FMT22$="   #####.##"
2720 PRINT CHR$(12)
2730 PRINT\PRINT "*****************************" \PRINT
2740 PRINT "  YOUR WAGE FOR THE YEAR." \PRINT
2750 O=20000.00
2760 PRINT USING " SALARY" + FMT17$,O
2770 PRINT USING " SALES COM" + FMT18$,.0025*T6
2780 PRINT USING " PROFIT COM" + FMT19$,.05*T5
2790 PRINT,"********"
2800 W9 = 20000+(.0025*T6)+(.05*T5)
2810 PRINT USING " SUBTOTAL" + FMT20$,W9
2820 PRINT " PENALTY FOR"
2830 PRINT USING "  SALES LOST" + FMT21$,.1*(L7+L6)
2840 PRINT,"********"
2850 PRINT USING " TOTAL WAGE" + FMT22$,W9-.1*(L7+L6)
2860  GO TO 2890
2870  INPUT " DO YOU WANT TO CONTINUE WITH THIS YEAR "A$
2880  IF LEFT (A$,1) <> "N"  THEN GO TO 100
2890 END
```

Sample run.

```
                         P U R E G A

                          written by
             Department of Restaurant, Hotel,
               and Institutional Management
                      Purdue University



DECISIONS FOR MONTH 1

 You have $ 20000  available for advertising and promotion

ADVERTISING? 5000
PROMOTION? 1000
WAITRESSES. YOU NOW HAVE  15 ? 10
WAITRESS TRAINING (HRS PER WAITRESSES)? 16
COOKS. YOU NOW HAVE  5 ? 0
DMOS. YOU NOW HAVE  8 ? 0
PREVENTIVE MAINTENANCE (UP TO 50)? 50


                          MONTH  1  RESULTS
*****************************************************************


           ***SALES SUMMARY***

ADVERTISING AND PROMOTION RESULTS

  ADVERTISING                 EXPENSE      SALES
    CURRENT                     5000       35863
      RESIDUAL                     0           0
  PROMOTION                     1000       12996
 SALES GAINED BY
 LAST MONTH'S EX DEMAND                        0
 SALES LOST BY
LAST MONTH'S TURNAWAY                      < 0 >

  TOTAL DEMAND                            104941
(INCLUDES NATURAL DEMAND)


$ 4941  MORE IN DEMAND THAN
THE RESTAURANT CAN HANDLE.

 20000  IN SALES LOST DUE TO NOT ENOUGH COOKS !!!

PRESS 'RETURN' TO CONTINUE?
*****************
PROFIT AND LOSS STATEMENT


                                        TOTAL         PERCENT
SALES                                   80000         100.00
EXPENSES

 FOOD & BEV                 30800                      38.50
 LABOR                      22040                      27.55
 TRAINING                    1064                       1.33
 HIRING                       500                       0.63
 ADVERTISING                 5000                       6.25
 PROMOTIONS                  1000                       1.25
 PREV. MAINT.                  50                       0.06
 REPAIR                         0                       0.00
 MISC. CONT.                 8800                      11.00

CONT. EXPENESE                          69254          86.57

FIXED EXPENSES                           4800           6.00

TOTAL EXPENSES                          74054          92.57
                       *************************************

PROFIT <LOSS>                            5946           7.43

PRESS 'RETURN' TO CONTINUE?

*****************

LABOR FORCE AT MONTH'S END

 WAITRESSES 21              COOKS 3       DMOS 5
DO YOU WANT YEAR TO DATE RESULTS ? N
```

```
DECISIONS FOR MONTH 2

 You have $ 14000  available for advertising and promotion

ADVERTISING? 100
PROMOTION? 200
WAITRESSES. YOU NOW HAVE  21 ? 0
COOKS. YOU NOW HAVE  3 ? 10
COOK TRAINING (HRS PER COOK)? 40
DMOS. YOU NOW HAVE  5 ? 0
PREVENTIVE MAINTENANCE (UP TO 50)? 0
```

* * *

```
                            MONTH  6  RESULTS
****************************************************************


              ***SALES SUMMARY***

ADVERTISING AND PROMOTION RESULTS

  ADVERTISING                  EXPENSE       SALES
    CURRENT                      1000        31379
    RESIDUAL                     2000         8051
  PROMOTION                       500         9628
 SALES GAINED BY
 LAST MONTH'S EX DEMAND                        283
 SALES LOST BY
LAST MONTH'S TURNAWAY                        < 1040 >

  TOTAL DEMAND                              110094
(INCLUDES NATURAL DEMAND)


$ 10094  MORE IN DEMAND THAN
THE RESTAURANT CAN HANDLE.

 16000  IN SALES LOST DUE TO NOT ENOUGH DMOS !!!

PRESS 'RETURN' TO CONTINUE?
*****************

PROFIT AND LOSS STATEMENT


                                              TOTAL        PERCENT
SALES                                         84000        100.00
EXPENSES

 FOOD & BEV                  32040                          38.14
 LABOR                       29800                          35.48
 TRAINING                     1714                           2.04
 HIRING                        650                           0.77
 ADVERTISING                  1000                           1.19
 PROMOTIONS                    500                           0.60
 PREV. MAINT.                    0                           0.00
 REPAIR                        541                           0.64
 MISC. CONT.                  9040                          10.76

CONT. EXPENESE                                 75285         89.63

FIXED EXPENSES                                  4840          5.76

TOTAL EXPENSES                                 80125         95.39
                            *************************************

PROFIT <LOSS>                                   3875          4.61

PRESS 'RETURN' TO CONTINUE?

*****************

LABOR FORCE AT MONTH'S END

 WAITRESSES 24               COOKS 8        DMOS 6
PRESS `RETURN` TO CONTINUE?

!!!!!!!!!!!!!!!!!!!!!

THE BOARD OF DIRECTORS HAS DECIDED TO FIRE YOU!!!
A LOSS OF $ 10997  IN SIX MONTHS IS UNACCEPTABLE.
YOU WILL BE PAID THE FULL SALARY BUT DON'T LET THE
DOOR HIT YOU IN THE #?&! WHEN YOU LEAVE.

PRESS 'RETURN' TO CONTINUE ?
```

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CIRCLE 252 ON READER SERVICE CARD

```
              R E S U L T S   F O R   Y E A R

                                            TOTAL       PERCENT
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*******************

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Stephen Arrants

It is October as your read this, though it is July as I write it. Days are getting shorter, cooler, and the trees in the Northeast are turning. Indian Summer is here. As I write this, we are just getting over a heat wave in the Northeast. With weather like this, hacking seems like the only sane activity. This month's column will feature a few more utilities you might find handy, a few reviews, and some useful information. So why not sit back and enjoy?

Fixing FID

For a while, I had just one disk drive. Some programs, such as FID, were constantly asking me for slot and drive numbers. I didn't like to be reminded by a hunk of metal and plastic that I couldn't afford another drive. I had been spending all my free cash to feed it things like *Deadline*, *Apple Writer*, and *Germany 1985*. I had to find a way to stop the program from tormenting me.

So, I came up with FFID, or the Fixed FID. What this short program does is amend FID so that it doesn't ask you silly questions. Now that I have a second drive, I could further amend it so that it automatically sets the slot and drives for my system. Slot 6, drive 1 for the read, slot 6, drive 2 for the write. For now, I will just give you the first rogram. See Listing 1.

To make this work, type the program in and amend line 40 if your drive isn't in the usual slot 6. Then BLOAD FID, EXEC FIXER, and BSAVE FFID, A2051, L4686. That's it. Quick, simple, and permanent.

Don't BSAVE this as FID; you may need an unaltered version at a later date. Since FID loads into the same area as an Applesoft program, I felt that the EXEC approach would be best. You could, of course, BLOAD FID and POKE in the values in line 70. That also works.

Poor Man's Lowercase

You say you have an Apple II+ without lowercase? You are tired of entering complicated codes to make your printer give you lowercase? I have just the fix for you. Although the Apple II+ can't display lowercase unless a modification is made, none is really needed by a printer. Most printers will display lowercase when 32 is added to the ASCII code of a letter.

Usually, this is done by hitting a CTRL character as an indicator and processing each character in Basic. Clumsy. Slow. Inefficient. It would be much better to intercept the output and add 32. After all, computers are supposed to be efficient, right? Enter this routine (Listing 2), which is for an Apple II or II+ with DOS 3.3 and a printer in slot 1.

This short routine is stored at location $BA69 and is not permanent. CTRL-S is used to toggle lowercase on/off. If a different character is desired, change the value at $BA6D. The routine is selected by the program in Listing 2.

All hooks are returned to their normal values by the "PR#0" in line 70. PR#1 isn't needed, since JMP at the end of the routine selects the printer slot, number 1.

After the routine is typed in and you have checked it for errors, save it as follows. BSAVE LC,A$BA69,L$2A. That's it! Simple, quick, and clean.

Ah! But there's another modification we can make. Suppose we want a line in mixed *normal* and *inverse* display. We could split the line up with various commands, which looks sloppy and can cause formatting headaches. We could also write a machine language program to save us the trouble. The routine in Listing 3 does just that.

Again, CTRL-S is used as the toggle, but you can change it to suit your needs. Turn it on with the following: POKE 40196, 105: POKE 40197, 186. Turn it off with POKE 40196, 189: 40197, 158.

Look at $BA6F. If we change the value to 7E, we will get a flashing character instead of inverse. Save with the following: BSAVE INV,A$EA69,L$10. Remember: don't add spaces between the commas!

Lazarus, or Bringing a Program Back From the Dead

From time to time, we all do stupid things with the Apple. How many times have you typed in a program and then entered INT, FP, or NEW? Our next little routine (Listing 4) may help you recover lost material. I call it Lazarus, since it brings some programs back from the dead.

How does this work? Well, when you do an FP, INT, or NEW, you don't actually get rid of a program. It is still lurking somewhere in your Apple. If you ran the short program from August, you probably saw bits of old programs floating around, unless you started out fresh. The trick is to get the deceased program back where you can SAVE or RUN it.

When you NEW something, you tell the Apple to set some bytes as nulls ($00). From then on, the Apple treats that program as if it had never existed, except in some dusty corner of memory. What we have to do is reset these bytes and bring the dead to life. Not a miracle, just a few lines of machine language.

Save this program as BSAVE LAZARUS,A$2BF,L$41.

Letters, Errors And Omissions

In the August Apple Cart I mentioned that the Rev. B board may be un-

Listing 1.

```
10  REM   THIS IS THE LETTER AFTER N -->O.  THIS IS A ZERO -->0.
20 D$ =  CHR$ (4)
30 P$ = "FIXER"
40 S = 6
50  PRINT D$"OPEN"P$
60  PRINT D$"WRITE"P$
70  PRINT "POKE 4895,"S":POKE 4896, "S":POKE 4893,1:POKE 4894, 1:POKE2328
     ,255:POKE2363,96:POKE2439,96:POKE4899,255"
80  PRINT D$"CLOSE"P$
```

Listing 2a.

```
10  REM   THIS IS THE LETTER AFTER N--> O.   THIS IS A ZERO--> 0.
20  REM  >>>THE LOWER CASE PROGRAM MAY NOT WORK ON ALL PRINTERS.<<<
30 D$ =  CHR$ (4)
40  PRINT D$"BLOAD LOWER-CASE"
50  POKE 43603,105: POKE 43604,186
60  PRINT "TESTING LOWER CASE. . .": REM  CTRL-S EMBEDDED IN THIS LINE
70  PRINT D$"PR#0"
```

necessary at this time because there is no commercial software available to take advantage of the double hi-res graphics it allows. Jerry Van Cleeff of Montgomery, AL wrote in to take me to task for this statement.

I agree with him that you can write your own routine to get the 560 × 192 resolution graphics. But I would think twice about rushing out to buy the 80-column extended memory card and getting a Rev. B board simply to see 16 colors in double hi-res. Until good software is available, I would wait. True, Apple is still offering the upgrade for free, but that is not reason enough to buy the 80-column extended memory card.

By the way, the July 1983 issue of *Softalk* has an excellent article by Don Worth on how to run and understand double hi-res graphics on the IIe.

I stand by my statement to be careful when using *What's Where in the Apple.* Although Apple has been careful to keep monitor entry points and soft switches the same as in the Apple II+, not everything is the same. It is a new machine, Jerry.

Oops! There may be a problem when using the program in Listing 1 from August. On the IIe, it will crash when it turns on the soft switch at location 49237, where page 2 is selected. Jerry suggests hitting CTRL-C, typing TEXT, and then continuing. The program will crash again at location 49280, where it selects an alternate bank of RAM, entering the land of no return. RESET to get out. Skip locations 49152 to 53247 for painless execution. Apparently, these soft switches aren't the same, Jerry.

Listing 2.

```
*BA69.BA92

BA69-  8D 92 BA C9 93 D0 09
BA70-  A9 20 38 ED 91 BA 8D 91
BA78-  BA AD 92 BA C9 C1 30 0E
BA80-  AD 92 BA C9 DA 10 07 AD
BA88-  92 BA 18 6D 91 BA 4C 02
BA90-  C1 00 00
```

Listing 3.

```
*BA69.BA76

BA69-  48 C9 93 D0 07 A9 3E
BA70-  38 E5 32 85 32 68 4C
```

Listing 4.

```
*02BD.02FF

02BD-  A0 04 C8
02C0-  B9 00 08 D0 FA C8 8C 01
02C8-  08 A9 08 8D 02 08 85 01
02D0-  A0 00 A2 03 A9 00 85 00
02D8-  C8 D0 02 E6 01 B1 00 D0
02E0-  F3 E6 00 E4 00 D0 F6 18
02E8-  98 69 03 85 AF 85 69 85
02F0-  6B 85 6D A5 01 69 00 85
02F8-  B0 85 6A 85 6C 85 6E 60
```

This little bug shows up the differences between the II+ and IIe. The program runs fine on a II or II+. On the IIe, there are problems. If you really want to see something strange, run it with an 80-column extended memory card. Talk about locking-up!

Thanks for the letter, Jerry. It is people like you who keep me on my toes. To the other letter writers, thanks for the compliments, complaints, and queries. I can't answer every letter, but a SASE ensures a reply.

In last month's column, a reader wanted information on using an Apple in sailboat navigation. Well, a few people in our book division, politely mentioned *Computers for Sea and Sky* by Stephen J. Rogowski. It is published by Creative Computing Press and sells for $9.95.

This collection of programs for sailing, aviation, navigation, astronomy, and surveying is quite nice. Mr. Rogowski is a licensed pilot and an FAA ground instructor, so he knows what he is doing. He is not a bad writer, either. Not only does he give you over 50 programs, but he explains in clear language how they work and what they can and can't do. A list of references is included to help you write more advanced programs on your own.

New Products

Verbatim Corporation sent me a disk diagnostic package the other day. I have mixed feelings about diagnostics packages. It is nice to know when something is wrong, but if you are like me, you know that knowledge can cause paranoia and depression. I mean, knowing that your disk drive heads are out of alignment at 2:00 a.m. is informative, but then try and get to sleep! Still, it is a useful product.

I now know why I kept losing disks—my secondary drive was poorly aligned. One warning—if a drive has serious problems, test your disks on a good drive. If the good drive doesn't read them properly, copy them over from the bad drive to new disks on the good drive. Otherwise, you may not be able to recover data.

What the *Disk Drive Analyzer* does is perform four comprehensive tests covering head alignment, disk clamping (how tightly the drive holds your disk in place), read/write accuracy, and disk speed. Your drive is evaluated as good, fair, or poor and rated pass or fail, indicating whether tested areas require adjustment or repair.

Verbatim claims that is the only product that effectively tests drive alignment without taking the drive apart. The price seems a bit steep, however, at $69.95. As a special introductory offer, Verbatim will send you a head cleaning kit or a twin pack of mini disks when you return the warranty card.

Inside the Apple

For the hardcore hackers and hobbyists, a new book has hit the racks that may be just what you are looking for. *The Apple II Circuit Description* by Winton Gayler from Howard Sams is a large book stuffed with all sorts of hardware information on Apples from Rev. 0 to RFI Rev. D. Although the IIe is not covered, this is still a very valuable book. It is tough, thorough, and labyrinthine.

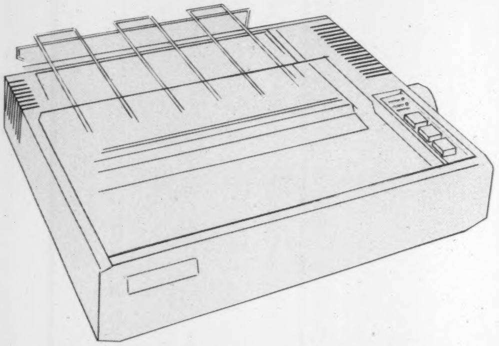
Six chapters examine every bit of the Apple circuitry. You get information on the 6502, on I/O, video display, and timing. Chock full of diagrams and schematics, this book makes a good addition to your library.

One surprise is that all the schematics and diagrams are readable. I am used to cramped little sketches that resemble bad road maps. Mr. Gayler did a monumental job in writing the book. It is well-organized and well-planned.

Apple II Circuit Design isn't for everybody. You do need some prior knowledge of electronics to understand most of the concepts. But for the serious hacker and hobbyist, as well as anyone involved in repairing Apples, this may be one of the most important and informative books you will own.

Finally

That's it for this month. I've decided *not* to give you the program I promised for recovering a deleted file. Instead, it will be part of a longer program presented over the next few Carts. This longer program is a disk utility that will allow you to examine and edit a track and sector, recover a lost file, hide files that you don't want seen, and customize DOS the way you want it. See you in November. ☐



...print about printers...

John J. Anderson

An anecdote. Before this column became a column, it was the second installment of a printer round-up. Someone here told me that C. Itoh had called, and in the article I kidded to be sorry it had not been Mr. Itoh himself—for I would have liked to ask him what the C stood for.

From San Francisco, Mr. Philip C. Huang: "I read with great interest your article. . . in which you mentioned that you would like to know what the C stands for in C. Itoh. . . C. Itoh is a major trading company in Japan. The C stands for 'Chu,' which literally means 'loyalty' in Japanese. In this case, Chu was the given name, and Itoh was the surname of a person. . . perhaps the founder of the company, which was established in 1949."

Fascinating, Mr. Huang, and thank you. Now what does the C in *your* name stand for?

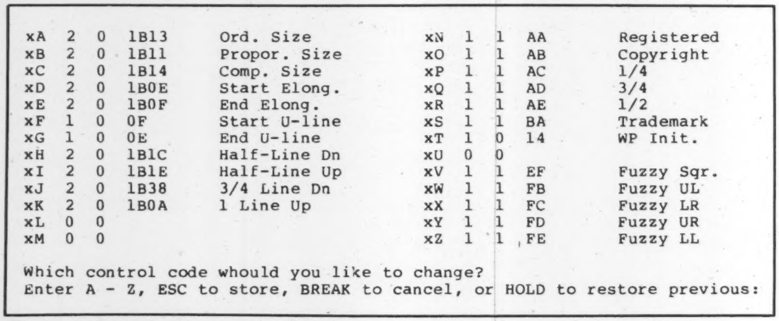
SuperScripsit Feedback

More from the mailbag. This letter is from Barton Hendrix, of Oakdale, CA, though we have received more than one letter along these lines:

"As one who uses a TRS-80 Line Printer VI with *SuperScripsit*, I was anxious to read Ted Byrne's article on the subject in your June 1983 issue. I hoped that it would contain some new ideas to play with. To say the least, I was disappointed. Mr. Byrne devoted his article to explaining how he wrote an auxiliary program to set pitch and line spacing on his printer before loading *SuperScripsit*. Didn't he read the program documentation?

"*SuperScripsit* uses the Daisywheel II driver to operate the LP VI and, as a result, there are some functions that do not operate exactly as intended. However, the program does provide for 20 user-programmed 'printer-code' keys. They allow the inclusion of special character codes. If the character width is set at zero, these keys work equally well to change line spacing or pitch. There are, however, a few things to keep in mind.

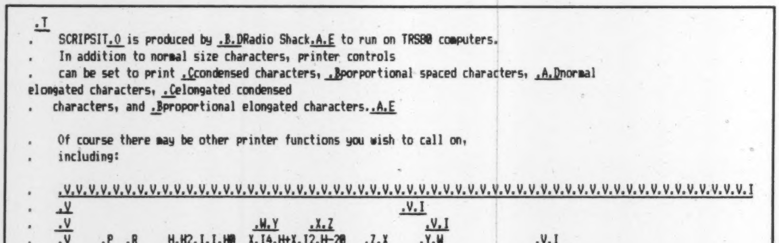
"• Whenever the LP VI receives a control code to change pitch or line spacing it will begin a new line at column 0. For that reason you cannot mix two pitches in one line. You should not include text between control codes and a carriage return.



```
xA  2  0  1B13      Ord. Size             xN  1  1  AA       Registered
xB  2  0  1B11      Propor. Size          xO  1  1  AB       Copyright
xC  2  0  1B14      Comp. Size            xP  1  1  AC       1/4
xD  2  0  1B0E      Start Elong.          xQ  1  1  AD       3/4
xE  2  0  1B0F      End Elong.            xR  1  1  AE       1/2
xF  1  0  0F        Start U-line          xS  1  1  BA       Trademark
xG  1  0  0E        End U-line            xT  1  0  14       WP Init.
xH  2  0  1B1C      Half-Line Dn          xU  0  0
xI  2  0  1B1E      Half-Line Up          xV  1  1  EF       Fuzzy Sqr.
xJ  2  0  1B38      3/4 Line Dn           xW  1  1  FB       Fuzzy UL
xK  2  0  1B0A      1 Line Up             xX  1  1  FC       Fuzzy LR
xL  0  0                                  xY  1  1  FD       Fuzzy UR
xM  0  0                                  xZ  1  1  FE       Fuzzy LL

Which control code whould you like to change?
Enter A - Z, ESC to store, BREAK to cancel, or HOLD to restore previous:
```

Figure 1. Scripsit printer control codes.



```
 .T
.    SCRIPSIT.0 is produced by .B.DRadio Shack.A.E to run on TRS80 computers.
.    In addition to normal size characters, printer controls
.    can be set to print .Ccondensed characters, .Bporportional spaced characters, .A.Dnormal
elongated characters, .Celongated condensed
.   characters, and .Bproportional elongated characters..A.E

.    Of course there may be other printer functions you wish to call on,
.    including:

.    .V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.I
.    .V                                              .V.I
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.    .V                                              .V.I
.    .V                                              .V.I
.    .V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.V.I
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Figure 2. Video screen version of text (Printer control codes are underlined).

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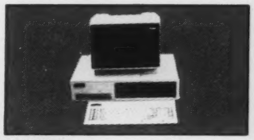

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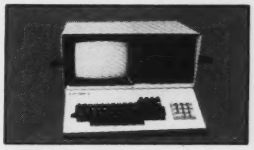

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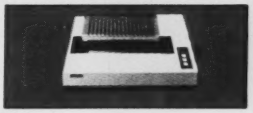

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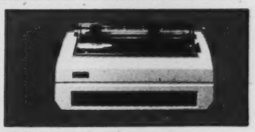

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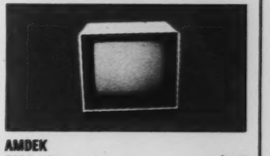

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Color III (RGB)	$359
COMREX	
CR5600G	$145
CR5600Y (Yellow amber)	$155
CR5600A (Amber)	$159
GENTECH	
GT-09G (9" green)	$109
GT-09A (9" amber)	$115
GT-12G (12" green)	$115
GT-12A (12" amber)	$119
TAXAN	
RGB Vision I	$275
(with Apple II + Cable & Interface)	$345
RGB Vision III	$519
KG 12N (12" green)	$125
KG 12N-UY (12" amber)	$135
QUADRAM	
Quadchrome RGB for IBM	$489

TERMINALS

Freedom 100 (11 FTN Key green)	$499
Visual 50 Detachable KYBD	$589
Televideo 910 +	$565
Televideo 925	$725
Televideo 950	$945

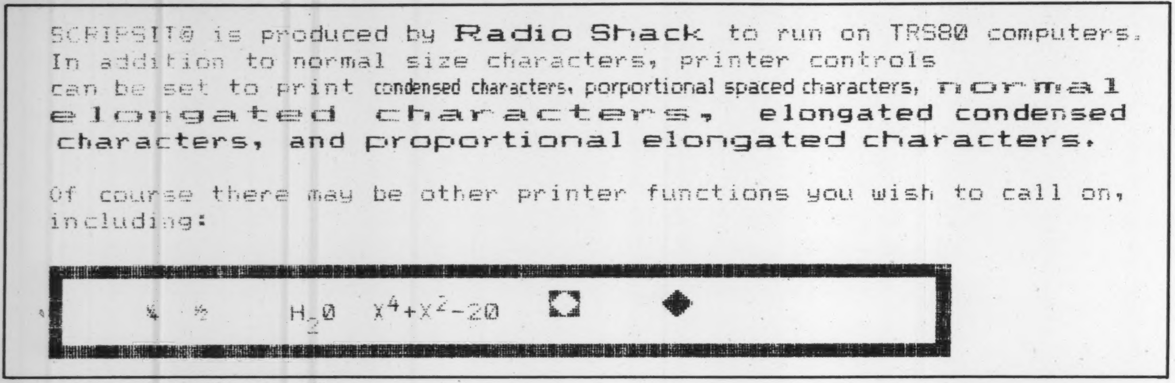
MODEMS

HAYES	
Micromodem II	$275
Smartmodem (300 BAUD)	$210
Smartmodem (1200 BAUD)	$509
Smartmodem 1200B for IBM	$469
Smartcom II (Terminal Prog.)	$99
NOVATION	
CAT 300 BAUD Acoustic	$144
D-Cat 300 BAUD Direct	$155
J-Cat 300 Small Size	$109
Apple Cat II	$269
103 Smart Cat	$179
103/212 Smart Cat	$429
SSM	
300 BAUD Modem Card	$239
1200 BAUD External Modem	$529
Transend 1/2/3	$69/$109/$209

SOFTWARE

FOR IBM PC	
IUS A/R A/P G/L I/C O/E	$389
Any three	$975
FOR DEC RAINBOW AND APPLE III	
PEATREE G/L A/R A/P I/C Payroll	$499

CIRCLE 166 ON READER SERVICE CARD



SCRIPSIT@ is produced by Radio Shack to run on TRS80 computers.
In addition to normal size characters, printer controls
can be set to print condensed characters, porportional spaced characters, normal
elongated characters, elongated condensed
characters, and proportional elongated characters.

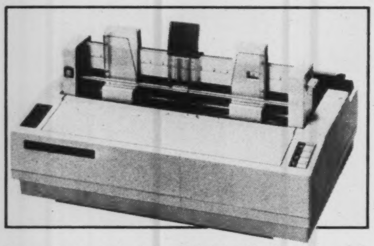
Of course there may be other printer functions you wish to call on,
including:

¼ ½ H_20 X^4+X^2-20 ▣ ◆

Figure 3. Actual printed version of text.

"• The driver remains unnotified if and when the pitch is changed within a document, and so margins and tabs must be adjusted accordingly.

"• The LP VI is not cooperative about accepting anything other than single-spaced lines through the Open Document Options. However, if you consider that you can select 6, 8, or 12 lpi through user-programmed keys and select single-, double-, or triple-spacing via a block action, it offers considerable flexibility.



Panasonic Model KX-P1160 shown with optional front inserter.

"• With the LP VI *SuperScripsit* counts whole lines at 6 lpi, so it may be necessary to adjust page specifications if the printer is set to 8 or 12 lpi. Bear in mind that the program allows a maximum of 99 lines per page. For that reason you should not use the narrower line spacing unless it is absolutely necessary.

"I do agree with Mr. Byrne that the LP VI is a sturdy, versatile printer. It simply requires a bit of creativity to make full use of its capability. With careful work at 12 lpi, it will even underline. The only things I have not been able to get it to do easily are those functions which normally require a reverse paper feed (such as subscripts and superscripts)."

In another letter J. Spence of Denton, TX, posits that Mr. Byrne was using an older version of the program. Spence is now using an LP VIII and Daisy Wheel II, but wrote his own program two years ago to get around the control code problems.

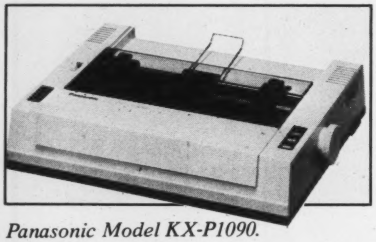
The control codes he is now using appear as Figure 1, the CRT version as Figure 2, and the printed results as Figure 3. Hope this helps some of you *Scripsit* users out there.

New Hardware

Two new dot matrix printers are on the way from Panasonic. The KX-P1160 can reach 165 cps in pica, 196 cps in elite. It can handle 15" paper, in fanfold or single sheet. An optional front inserter is available to friction feed single sheets to the printer.

The printer comes with a parallel interface standard. An RS-232 serial interface is available as an option. This model lists for $1750.

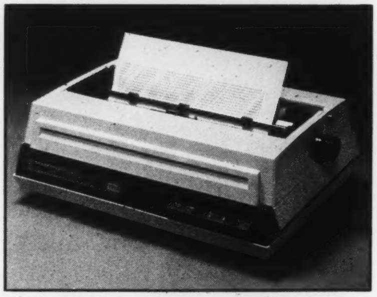
The model KX-P1090 can handle paper widths up to 10" and reach speeds up to 96 cps. It also features sprocket or friction feed. The suggested retail for the unit is $550.



Panasonic Model KX-P1090.

Both printers use a seamless cartridge ribbon. For more information contact Panasonic, One Panasonic Way, Secaucus, NJ 07094. (201) 348-7183.

Smith-Corona is following its original TP-1 with the TP-II daisy wheel printer. The SCM TP-II features both serial and parallel ports, selectable 10 or 12 pitch character sets, self-test switch, and new printwheels with program characters. This simplifies printing Basic listings.



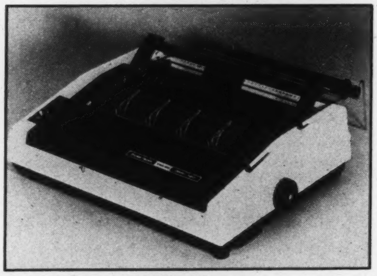
SCM TPII.

The TP-II incorporates several enhancements to its predecessor. Baud and parity DIPs are easier to set. Reversing polarity of the busy signal has been simplified, as have controlling linefeeds and carriage returns. An optional tractor feed feature has also been introduced to allow use of continuous form paper.

The list price of the unit is $900. For more information, contact Smith-Corona, 65 Locust Ave., New Canaan, CT 06840. (203) 972-1471.

Tandy has released a new $500 dot matrix printer capable of printing at 120 cps. The DMP-120 is code-compatible with all other Radio Shack printers, with the exception of some word processing codes (such as parts of *SuperScripsit).*

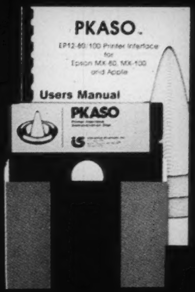
The graphics mode of the unit allows creation of almost any graphics con-



Radio Shack DMP-120.

PKASO™
Printer Interface Family

and Apple //e...
We work together


PKASO.
EP12-80/100 Printer Interface for Epson MX-80, MX-100 and Apple
Users Manual
PKASO
IS

PKASO Interfaces come complete with Cable, Instructional Diskette and Comprehensive Manual.

The PKASO family makes you and your Apple Computer a master of text and graphics.

PKASO makes it easy to use the features of your printer—select character sizes, vary line spacing, even print in colors. Simple PKASO commands make these features usable from the keyboard or a program.

PKASO also adds features to your system. Press a few keys and get a snapshot "dump" of the image you see on the screen—text or graphics. Add new characters and symbols that you couldn't print before, using our SuperFont™ system. Add our new PipeLine™ printing buffer and your printer can take its time while you and your Apple move on to the next task. The PipeLine is a modular add-on to the standard PKASO board.

The PKASO interface is designed for Apple II and Apple /// in all the popular configurations. It prints in full color on the IDS Prism Printer, and in striking black on C. Itoh, Centronics, Epson, IDS, NEC, and Okidata matrix printers.

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personal computers.

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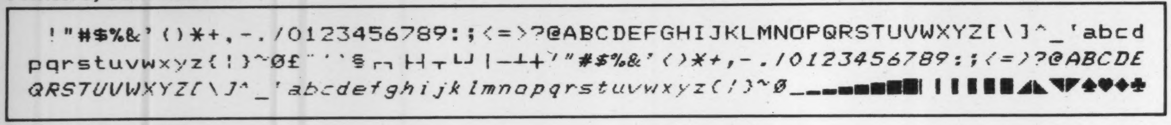
Printers, continued...



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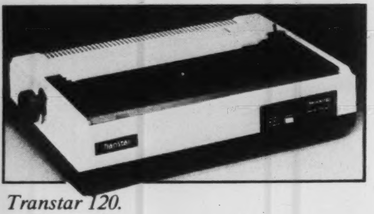
```

Spirit-80 print sample.

figuration needed. For more information, contact Tandy/Radio Shack, One Tandy Center, Fort Worth, TX 76102. (817) 390-3300.

Transtar has released its own model 120, but this, in contrast is a $600 daisy wheel printer. The unit provides letter quality print at 16 cps. With an automatic paper loading system, cut sheets can be positioned with the touch of a button. Tractor feed is available optionally. The unit has a Centronics parallel interface.



Transtar 120.

For more information contact Transtar, Box C-96975, Bellevue, WA 98009. (206) 454-9250.

That's the Spirit

The Spirit-80 is the latest entry from Mannesmann Tally, the people who brought you the MT-160 printer (given a rave review in the June 1983 issue). The Spirit-80 is their low-end entry, with a list price of $399 with standard Centronics parallel interface.

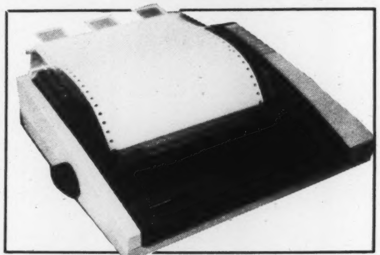
While it is not in the same class as the MT-160, it is much less expensive and has many features of more expensive machines. Compared with other machines in its price range, the Spirit-80 looks very good indeed.

At a printhead speed of 80 cps, the unit is capable of multiple fonts in extended, normal, and compressed modes, including italics. In compressed mode, up to 142 columns are available. The unit can handle superscripts and subscripts, and has a graphics mode offering resolution of 640 dots per line.

The printer can accept continuous form or single sheet friction feed. Up to three carbon thicknesses can be supported. Mannesmann claims a mean time between failures of over 5 million lines (excluding printhead life). The printhead is rated at approximately 30 million characters.

A large part of the speed of a printer can be judged by the linefeed speed. The linefeed time of the Spirit-80 is approximately 0.02 seconds—very quick for a $400 machine.

No graphics duty cycle is imposed, but guidelines are provided within the documentation so that a user can create duty cycles for his own use. Under normal conditions, however, none are necessary.



Mannesmann Tally Spirit-80.

A REPORTING SYSTEM FOR A SPREADSHEET DATABASE
(for any VisiCalc© or Lotus 1-2-3™ User)

Most database systems consider rows of data fields as records. The 3-D concept promoted by Abacus says to consider an entire report as a record. Therefore, visualize "pages" of reports stacked-on or scattered-around your desk; these would constitute your database.

VIZ-A-MERGE™

With Viz-A-Merge (Namely-A-Merge System) you can "cut and paste" sections of spreadsheet reports together to form new reports - - - Electronically!!! As a spreadsheet utility Viz-A-Merge allows you to combine sections, rows, columns, or single cells from any number of spreadsheet pages into one new report, or into an existing report, then recalculate selected formulas. For example, you could "cut" total year end columns from Department reports and the consolidated reports, then "paste" them together for overall company analysis. Or, you could place a total sales row into an income statement and recalculate all formulas.

VIZ-A-CON™

With Viz-A-Con (Namely-A-Consolidation System) you can add 3-Dimensional capability to your spreadsheet program. As a Report Writer to your database, Viz-A-Con allows you to select records ("pages"), get sub-totals and totals for all number fields, and have customized labels on the final report. For example you can perform hierarchical consolidations (Dept., Div., Company) or time period roll-up (Day, Week, Month, Qtr., Year). You can consolidate up to 50 files in one process and you can tie together as many as 80 processes in one group. Then play "what if" with VisiCalc and regenerate all reports in one single step.

Each Product has a simple Question & Answer procedure to assist you in organizing your report processes. You can create a complete reporting network from a spreadsheet database. They have the ability to "remember" the steps they went through to create the final reports. You can use your spreadsheet program to recalculate new data, then use our products to regenerate all new reports in one single step. Also, you can set-up special formulas to calculate additional data fields within the new reports. You can customize titles, row and column headings, footnotes, etc. for each report.

Both products include sample sessions which are easy to understand, allowing the average person to learn them in only 15 minutes. They are both compatible with dBase II™ (IBM), PFS Graph® and a host of popular products.

Abacus Associates is dedicated to producting products that allow users to create customized reporting systems tailored to the way they manually organize their data.

Please order either Viz-A-Merge or Viz-A-Con directly from Abacus Associates. Send your check or money order to Abacus Associates, 6565 W. Loop South, Suite 240, Bellaire, TX 77401, or credit card customers may CALL TOLL FREE (800) 547-5995, ext. 170. In Nebraska, (800) 642-9606, ext.170.

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Superior printer performance is not a fluke. It evolves from analyzing printed line after printed line. Taking the time to test and retest. After 30 years of manufacturing precision parts, we know that there are no shortcuts.

And so we took the Gemini-10X and methodically put it through its 120 cps pace. We achieved a print head life of over 100 million characters with an extremely precise dot alignment creating each crisp character.

So far so good.

Next, sophisticated performance demanded versatility. A wide choice of character sets, a buffer expandable to 8K, and the ability to interface with all popular personal computers. We added macro instruction, giving Gemini-10X the capability to perform up to 16 operations with one command. We included as standard a paper feed system that has a friction and fully adjustable tractor feed. Then we even built in the dexterity to print graphics and text on the same line.

Done.

And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.

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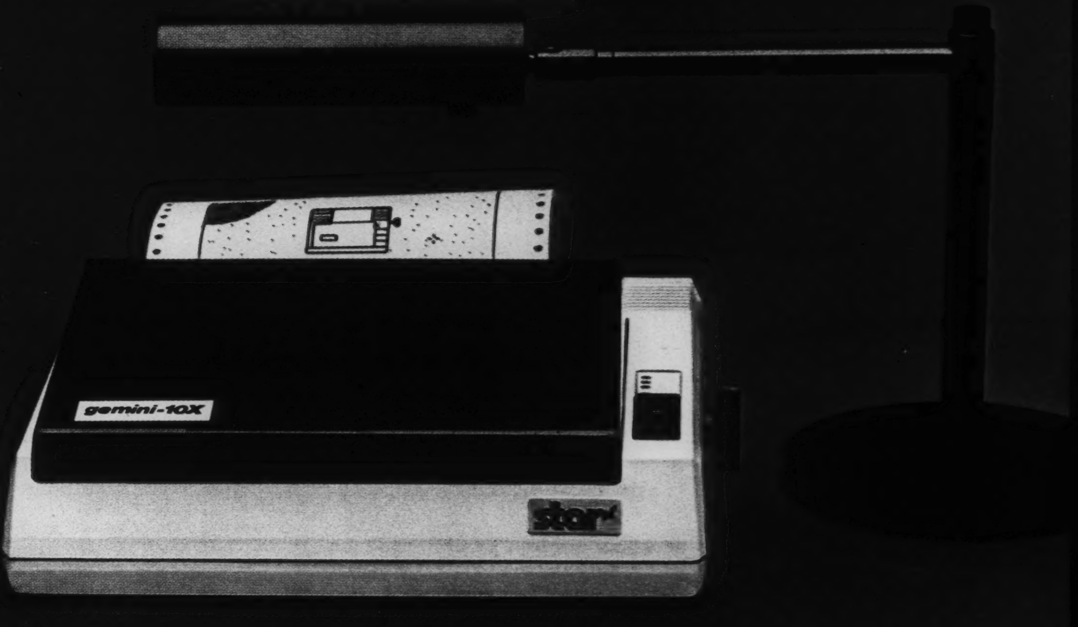


Printers, continued...

The documentation itself is much less impressive than that accompanying the model MT160, with less organization, more typographical errors and ambiguities. At one point the Spirit-80 is described as a serial-type printer, because the matrix printhead impacts the paper in a serial fashion. Jeepers creepers. People who have just bought a parallel printer may be a bit startled upon reaching that point of the documentation.

I have had the Spirit-80 in heavy use for about three days now, and have been very satisfied with its performance. The type quality is very good (see sample) and the paper feed is exceptional. A white wire paper guide keeps incoming and outgoing paper from ever crossing paths. And unlike most printers you will encounter, the tractors engage *before* the paper goes around the platen. This may seem like a trivial consideration, but I am convinced it helps lessen the potential for jamming when wrinkled or torn paper feeds through. It is a design feature well worth imitating.

The unit has a relatively heavy clear plastic cover, which helps lessen noise. I have seen printers at three times the price with much flimsier covers. Another classy move from Tally.

Overall, the noise during operation is quite tolerable. It is no ink-jet, but you don't need to turn it off to talk on the phone.

The large buttons on the top front of the Spirit-80 select and deselect on-line operation, as well as line and form feeds. LEDs indicate on-line, ready, and "paper out" conditions. There is a "'paper out" buzzer, that can be deselected as a DIP switch setting.

Top of form is set at whatever point the printer is turned on. To reset it, turn the printer off, advance the paper to the top of form, then turn the printer back on.

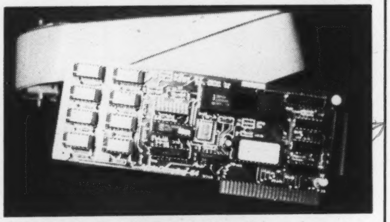
The cartridge ribbon is very easy to replace, and an extra cartridge is supplied along with the unit.

The Spirit-80 is another strong entry from Mannesmann Tally, and helps to round out its microcomputer product line. It is also quite a handsome machine—one of the best-looking new printers around.

For more information contact Mannesmann Tally Corporation, 8301 South 180th St., Kent, WA 98032. (206) 251-5500.

Delectable Dumpling

If you own an Apple and have been following our discussion of print buffers, make a note to learn more about a company called Microtek. We have been using their Dumpling-64 card in one of our Apples for months now, and it has faithfully performed as a parallel interface card, graphics printer card, and 64K buffer—a versatile product, to say the least.



Microtek Apple Dumpling-64.

If you already have or do not desire the buffer aspect of the Dumpling-64, you can buy the Dumpling-GX, which has all the interface features of the spooler, minus the spool. The card can drive any 8-bit parallel printer.

For more information contact Microtek, Inc., 9514 Chesapeake Dr., San Diego, CA 92123. (619) 569-0900.

Until next time, keep your ribbon inked, and may all your perforations be little ones. ☐

The MICROWRITER™
Daisy Wheel Printer.

MICROWRITER
olivetti PRAXIS 30

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With the Microwriter you will never again have to send an important letter or a simple correspondence that doesn't look impressive. Why settle for just any printer when you can have a MICROWRITER. . .a fine letter quality typewriter for you and your computer. For more information, see your local computer dealer or contact Ammicro directly.

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Larger Selection. Smaller Prices. Because we make more printers than anybody else, we can give you just the right one to fit your specific needs. Not to mention your budget. Suggested retail prices range from $449 to $2995. Call 1-800-OKIDATA (in NJ, 609-235-2600) for the dealer nearest you. Both you and your computer will enjoy the performance.

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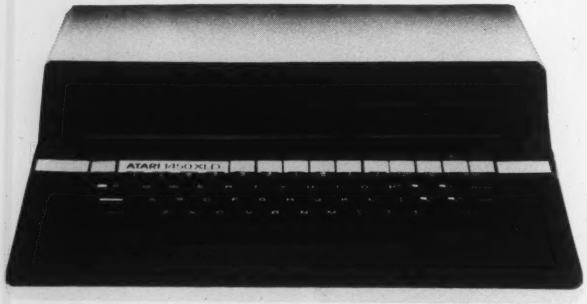

ari...outpost atari...out

John J. Anderson

Hey there folks, and welcome to the Outpost. The talk here concerns Atari, and we're pretty serious about the hobby. We have no qualms with the statement that the Atari microcomputer is absolutely the best machine in its class. So rather than spend a lot of time welcoming you here or beating around the bush, let's get right down to business.

First off, you'll notice that the machine at the top of our masthead has been changed. It is no longer our trusty Atari 800, but the flagship of the brand new Atari line, the 1450 XLD.

Author Author

You know it has never escaped us that many of the real contributions to the Outpost, and to all Atari-specific publications everywhere, come from you, the "everyday" Atari user. Your interest, individually and through user's groups, sustains columns like this one. A good example will follow shortly.

In that spirit it is our pleasure to reissue a call for manuscripts. We have begun work on *The Creative Atari II*, and are actively soliciting new material to appear within its pages. If you have an application for your Atari that other Atari owners should know about, for goodness sake, send it in. Make sure it is typed and double-spaced. If you are including a program listing, send a cassette or disk (disks preferred) along too.

Just imagine: to be immortalized within the pages of *The Creative Atari II.* What glory! What privilege! And we'll pay you, too.

And if your application is truly outstanding, you might see it right here in the Outpost as well.

So get to work. Our address is 39 East Hanover Ave., Morris Plains, NJ 07950. Send your material to *The Creative Atari,* and if you wish it returned, enclose a correctly sized, self-addressed, stamped envelope.

Book Beat

The Creative Atari Vol. I, by the way, has been on the stands for a few months now. Along with *all* the Atari material that has appeared in *Creative Computing* up through March 1983, it includes new material, never seen before. It is definitely worth checking out.

Other new Atari books worth a mention are the following:

I Speak Basic to My Atari, by Aubrey Jones, Jr. 229 pp., teacher's edition, 244 pp., Hayden Books, Rochelle Park, N J. A computer literacy course focusing on the Atari computer. Good Basic tutorial for kids seventh grade and above, including sections on the disk drive and how to do simple graphics. Chock full of exercises and quizzes. I can see this text becoming a favorite at Atari computer camps. The teacher's manual provides many valuable ideas and is accompanied by exam masters that you can reproduce.

Programming Your Atari Computer, by Mark Thompson. 272 pp., TAB Books, Blue Ridge Summit, PA 17214. One of those tailored how-to type manuals like Chilton's auto guides, using generalized information for early chapters, then moving to machine-specific information. Doesn't get to the meaty Atari information until chapter six. Still, you might want to have it as a back-up reference. And in all fairness, early chapters on binary numbers, computing principles, and Boolean algebra are worthwhile, though not Atari-specific.

User's Handbook to the Atari 400/800 Computers, by Jeffrey Weber and Stephen Szczecinski. 319 pp., Weber Systems Inc., 8437 Mayfield Rd., Cleveland, OH 44026. Takes you all the way from installation of the machine through graphics and sound. Nice coverage on some of the ins and outs of Atari Basic. Includes chapters detailing use of the 410 cassette recorder, 810 disk drive, and first generation Atari printers. Some worthwhile programs. Numerous appendices.

For more Atari reference sources, see the May 1983 and December 1982 Outpost columns.

While we are on the topic of books, allow me to redress a *faux pas* (the first of two to be set right this month). In the August column, I cited the Alfred book *Understanding Atari Graphics* without crediting its author, Michael Boom.

ATARI COMPUTER OWNERS:

Pick the positively perfect, practical, printer-port peripheral package, from PERCOM DATA!

PERCOM DATA

That's right... the positively perfect PERCOM DATA 5¼", floppy disk drive with a BUILT-IN PRINTER-PORT, for your Atari® 400/800 is now available!

Until now, Atari computer owners who wanted to hook a printer to their computer had only one choice... spend about $220 for an interface device. THOSE DAYS ARE OVER. PERCOM DATA has built a parallel printer-port right into its new AT88 PD model. Now you can add a quality disk drive system AND have a place to plug in a printer... WITHOUT BUYING an interface.

The AT88 S1 PD™ disk drive operates in both single density (88K bytes formatted) and double density (176K bytes formatted).

What more could you want? NO INTERFACE... a high quality PERCOM DATA disk drive... AND a built-in PRINTER-PORT... all with a price of $599.

Pick up a positively perfect PERCOM DATA disk drive, with printer-port... pronto!

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CIRCLE 268 ON READER SERVICE CARD

Outpost: Atari, continued...

Whoops—sorry, Michael. Merely an oversight on my part. It is a fine effort.

Before we switch topics—a periodical index for the Atari computer has been published. Called Soft Finder 1.1, it comprises a two-year composite index of Atari-related articles in *Creative Computing, Analog, Antic, Compute,* and the Eugene *ORACE* Newsletter. Plans are to release new issues quarterly. Cost is $6 an issue. For more information, contact Valley Soft, 2660 S.W. DeArmond, Corvallis, OR 97333.

Also, note that the correct address for ordering back issues of *Creative* is the New Jersey address listed above, not Boulder, CO, as stated in Soft Finder.

Show And Ataritel

We shall very shortly see the first products resulting from the formation of *Ataritel*. If you have not heard that name before, suffice it to say that it shall constitute Atari's foray into the telecommunications market. Atari hopes to ease the way for the consumer by marketing inexpensive and easy-to-use telecommunications products.

For quite a while now Atari has refused to disclose a thing about any Ataritel products on the drawing board. One can only hope that the products will be something more than an autodial phone or modem unit in the shape of E.T.

What kinds of products might they truly offer?

Well. Imagine for a moment a machine along the following line. When the phone rings, it automatically picks up (it has a telephone built-in). It determines whether the incoming call is from a human or another computer, by listening for a carrier tone. If the call is from a human, the Votrax chip within the unit asks the caller to hold on, while it summons you. If you are not available, it says so, and offers to store a message. If the call is from another computer (requires a telecommunications connection), the unit automatically provides its own carrier, and hooks to its terminal program (it has a computer built-in, too).

This same computer can place telecommunications calls for you at preselected times you specify. Hooked to your home television, it provides interactive videotex. Through this system you can access an almost unlimited quantity of information. It can, of course, dial into Compuserve, The Source, campus mainframes, or individual bulletin board services. It will autodial all of your normal voice connection calls as well.

It may also be tied into your home security system, monitoring the place, and automatically dialing the police if it finds anything too strange going on.

Is something like this superphone one of the products upcoming from Ataritel? Only time will tell.

Farewell 400

Right now the Atari 400 is just about the best buy in microcomputers: I saw a price of $70 (after rebate) the other day. Of course the reason prices are this low now is to make room for the new models.

The Atari 400 and 800 are now a part of history. But they are a memorable part. So long fellas; we'll remember you. I'm sure that tens of thousands of you will still be computing ten years from now. If you still don't have an Atari, and you have $70, and you can find one, my advice is to shell out for an Atari 400 without delay. How can you resist? And you may get the *very* last one!

Third-Party Thingies

Have you heard about *XBasic,* from

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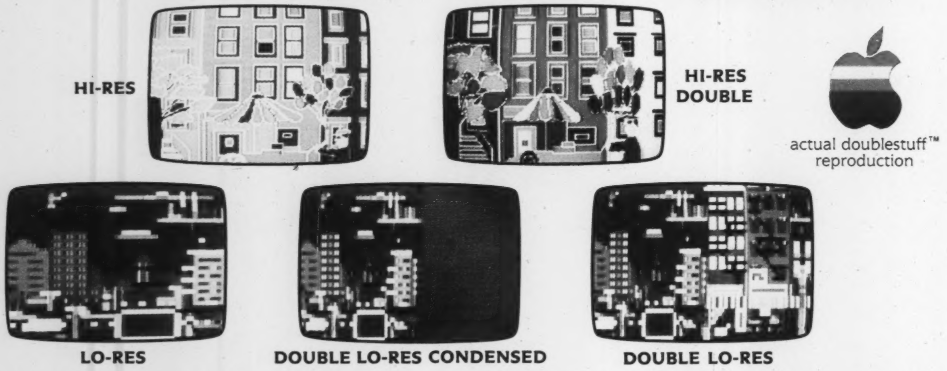

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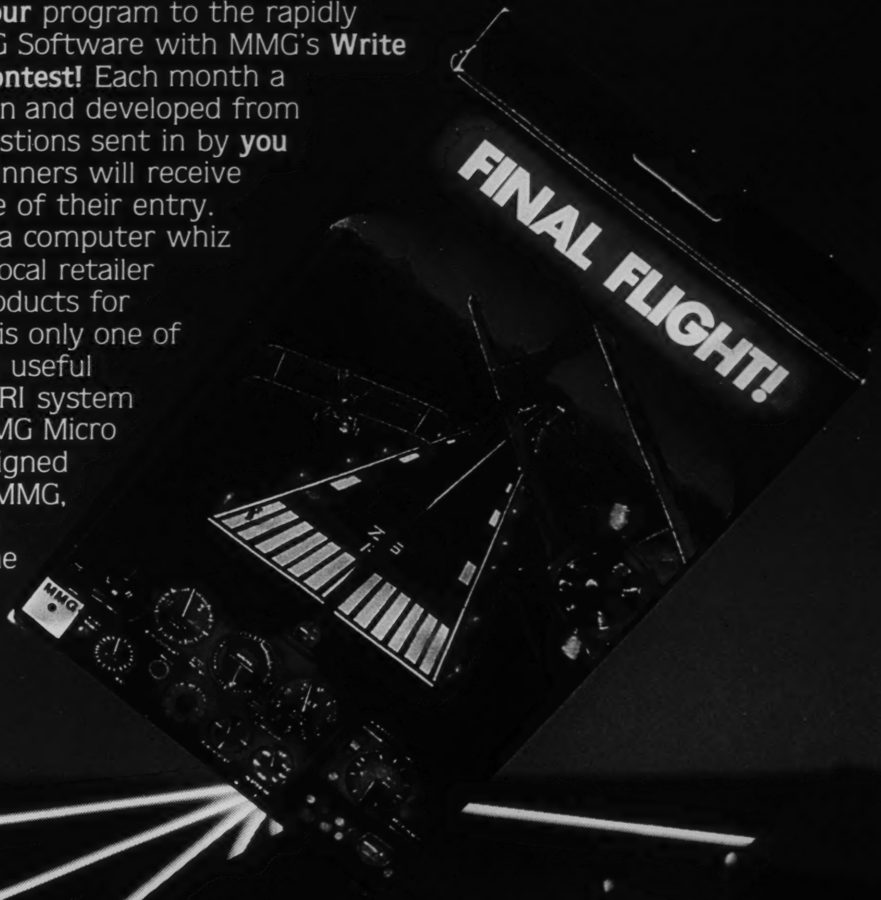

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Outpost: Atari, continued...

Superware? It is a 2K machine language program that adds several interesting features to Atari Basic. Among them is the capability to construct string arrays, just as in Microsoft Basic. Using a USR call you may define up to eight simultaneous string arrays. Other commands simplify sound and graphics commands, along with a few other neat capabilities.

As opposed to some other enhancements to Atari Basic, Superware allows XBasic to be freely included in user-developed software for sale, as long as the XBasic program source code is inserted along with a credit screen. For more information contact Superware, 2028 Kingshouse Rd., Silver Spring, MD 20904.

Adventure International has released a package called *Ultra Disassembler,* which makes a good go at reconstructing Atari source code from machine language. Not only can you read code from memory, but you can disassemble DOS files, even specific disk sectors, without regard to pointers or file structure. Disassembled code can be reassembled with any Atari assembler.

For more information contact Adventure International, Box 3435, Longwood, FL 32750.

If you have a CP/M system at home as well as an Atari, you may be interested in the Critical Connection, a hardware/software interface that allows your Atari to use the keyboard, drives, and printer of any CP/M computer with a 19,200 baud serial port. The original interface product has been improved to make installation to popular CP/M machines more simple. For information contact USS Enterprises, 6708 Landerwood Lane, San Jose, CA 95120.

Looking for a 3-D scrolling game with some real staying power? Try *Blue Max* from Synapse on for size. In it you are a World War I flying ace on a mission deep in enemy territory. The graphics are superlative, and the game is very hard to master.

As you fly northeast, the terrain scrolls by below you. Your job is to knock out selected bridges, ammo dumps, and enemy enclaves. You will be under constant attack, however, by enemy planes and ac-ac guns.

It takes a while to learn to pilot your biplane, and you will get used to crashing really quickly. You only get one plane per game, so stay near the START key.

After a few hours of practice, you may begin to get the hang of steering, bombing, strafing, refueling, and dodging enemy fire. If arcade-style shoot-'em-ups are your thing, *Blue Max* is a must.

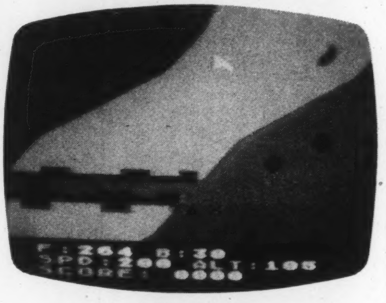
With products like *Blue Max*, Synapse remains among the pre-eminent action game houses for the Atari. Their latest release, *Dimension X,* features an absolutely mind-boggling effect called "altered perspective scrolling." As your craft moves low over surface terrain, the ground scrolls by in perspective. It is simply the most impressive three-dimensional graphics effect since *Star Raiders.*

Because it was demonstrated for some time before release at CES and other shows, some critics have labeled it "an effect in search of a game," and admittedly the action itself is very reminiscent of *Raiders.* But the effect is smashing. If anybody works up a snippet of code, in assembly or Basic, that approximates the scrolling effect, we will print it here.

Dander's Up

There I go about graphics again—I had better watch myself. You can't be a serious educator and be simultaneously serious about quality microcomputer graphics, you know. Or so some people might have you think. Take a quick look at the I/O section of this issue for an example. The charges upset me.

Regular readers of this column will know that I abhore "fluffware" as much as the next person. It's just that I abhore *swillware* more. That is all I meant to say in the July column (and that is all I did say). I did not indict software minus graphics—some of my favorite programs are all text. I did not try to present Trip Hawkins as a role-model for all educational software makers—just as an original and pace-setting figure in the industry.



Blue Max.

Faux Pas Numero Deux

Told you I'd be apologizing again. A.J. Sekel of Atari called the other day to set me straight on a claim I had made in the August Outpost and in the latest installment of the *Buyer's Guide.* My statement was that the new crop of Atari computers had returned to the old operating system of the 400 and 800. What I should have said was that they returned to a *compatible* operating system with the old machines.

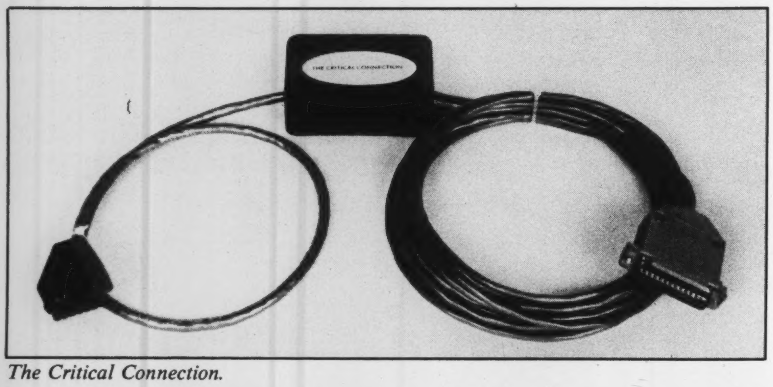
According to Mr. Sekel, the new machines incorporate a redesign of the model 1200 OS, which was originally incompatible with much 400 and 800 software. Such is no longer the case. Certainly I did not mean to imply that the new 64K machines employed a 48K operating system: that would be quite tough. The wording was wrong. My booboo. Sorry, guys. When you're right, you're right, and I'll say so.

Stonewall Bartlett

Of course when you're wrong, you're wrong. This one made me chuckle. James Rose, of Long Beach, CA, is one of the faithful Atari fans that took mighty pen in hand in the letter-writing campaign to help kill the 1200. He got a delayed but interesting response, and took the time to share it with me. It is signed by a Mr. William Bartlett, Manager, Product Support. In part it read:

"The article you refer to from *Creative Computing* was misleading in several ways. The 1200XL will not be redesigned. There will not be a return to the 400/800 operating system. There will not be an expansion chassis feature available. The 1200 will continue to be sold in its original configuration."

Ooh, shame shame, Mr. Bartlett. I



The Critical Connection.

may have made a misstatement, but *you* are the one who was misleading. Don't believe a word of it, Mr. Rose. Fact is if you and other Atari loyalists had not made the effort, there would have been no return to compatibility or expansion capability in the new machines, and Mr. Bartlett's statement would be true. The Atari 1200 would not have been discontinued. And Atari computers would probably have disappeared entirely by now.

Stringing Along

I had a nice talk with Charles Zubieta yesterday, who is a 16-year-old Atari tyro from La Jolla, CA. Using his 16K 400 with cassette drive, he has managed to turn out two really nice scrolling demos. Nice enough to give him the guest tutorial spot this month.

Ever since the days when the legendary George Blank was manning the Outpost, the technique of storing graphics data in strings has been discussed. George showed how players could be saved as strings, and then changed on the fly. The method is simple and fast.

Well young Mr. Zubieta has taken things a bit further, and gotten some good results in just a few program lines (and that's the way I like to see, and type, listings).

The best thing I can do at this point is turn over the proceedings and let Charles take it from here. If you have questions, please correspond directly with him. He can be reached at 6477 Caminito Baltusral, La Jolla, CA 92037.

Take it away, Charles.

* * *

Being a programmer can be a very frustrating experience, especially if you only know Basic. More than once I have started a game program, then had to abandon it simply because it was too slow. I have tried all the tricks. Very few of them had a significant effect on the speed of my program—until now.

One dull evening I was experimenting with player missile graphics using strings. By making the operating system treat the player missile area as a string, it is possible to achieve high speed animation and vertical movement.

Taking it further, instead of making the operating system think the player missile area was a string, I made it think that the screen RAM was a string. Little did I know what I had stumbled upon. I had gained the ability to control every single byte of screen memory at machine language speed, without all the hassle.

As I continued to experiment, some possibilities began to come to mind. By the time the sun was coming up, I had tested most of them. Here is a list of some of the possibilities:

- Multiscreen playfield.
- Vertical scrolling.
- Horizontal scrolling.
- Mixed scrolling.
- Automatic screen save in the blink of an eye.
- Super fast text handling on the screen.
- Super fast animation with as many objects as you want.
- High-resolution drawings done in the blink of an eye.
- Full compatibility with screen editor.

I couldn't believe it. I was able to do all these things in Basic, without any machine language subroutines. This list by no means exhausts the possibilities of

Program 1. Horizontal coarse scroll.

```
1 REM ** MIXED SCROLLING ROUTINE **
4 REM **   BY CHARLES ZUBIETA    **
5 REM
6 REM
7 REM
8 REM
9 REM DIMENSION A$
10 DIM A$(960):REM DIMENSION STRING
19 REM FIND VARIABLE TABLE
20 VTABLE=PEEK(134)+256*PEEK(135)
29 REM FIND SCREEN MEMORY
30 SCREENRAM=PEEK(88)+256*PEEK(89)
39 REM FIGURE OFFSET
40 OFFSET=SCREENRAM-ADR(A$)
49 REM FIGURE POINTERS TO FOR A$
50 V3=INT(OFFSET/256)
60 V2=OFFSET-256*V3
69 REM ASSIGN POINTERS
70 POKE VTABLE+2,V2
80 POKE VTABLE+3,V3
100 SETCOLOR 2,0,0:SETCOLOR 1,0,15:SETCOLOR 4,8,4
110 REM MAIN PROGRAM
119 REM DIMENSION SCROLLING STRING
120 DIM MESSAGE$(1000)
130 MESSAGE$="♥the♥message♥now♥being♥scrolled♥is♥written♥in♥lower♥case
    ♥because♥the♥internal♥character♥set♥is♥"
140 MESSAGE$(LEN(MESSAGE$)+1)="compatible♥with♥atascii♥only♥in♥the♥low
    er♥case♥this♥message♥is♥being♥scrolle"
150 MESSAGE$(LEN(MESSAGE$)+1)="d♥by♥making♥the♥operating♥system♥think♥
    the♥screen♥is♥string♥storage♥area"
160 MESSAGE$(LEN(MESSAGE$)+1)=MESSAGE$(1,40)
170 ? "↰":POKE 752,1
200 POSITION 0,1:? "    Mixed Scrolling Example Program"
202 POSITION 0,20:? "       Written By Charles Zubieta"
203 REM * LOOP THAT CONTROLS SCROLL *
205 PI=1:NI=LEN(MESSAGE$)-40
210 A$(121)=MESSAGE$(PI,PI+39)
220 A$(201)=MESSAGE$(NI,NI+39)
221 A$(281)=MESSAGE$(PI,PI+39)
222 A$(361)=MESSAGE$(NI,NI+39)
223 A$(441)=MESSAGE$(PI,PI+39)
224 A$(521)=MESSAGE$(NI,NI+39)
225 A$(601)=MESSAGE$(PI,PI+39)
226 A$(681)=MESSAGE$(NI,NI+39)
300 TRAP 205:PI=PI+1:NI=NI-1
500 GOTO 210
```

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the technique. I am sure as you get used to it you will think up more incredible things that can be done.

Now let's get down to the nitty gritty of precisely how all this is done. Before I go too far, I think I should warn you that when working with text, the ATASCII values of the characters in your string will be converted to the *internal* character set. This is a small problem that is easily overcome. As a matter of fact, this little problem can even be turned into a plus when used the right way, but I'll save that for another article.

The first thing you have to do is decide what you want to effect and how much string space you are willing to sacrifice. With this done you can design your string.

Just to simplify things, from here on the string used as an example will be A$. The first thing you want to do is make sure that A$ is the first variable you dimension in your program. This is very important. With this done, the variable table must be located. The pointers for the variable table are memory locations 134 and 135. So VTABLE=PEEK(134) +256*PEEK(135). None of this does us any good unless we know where to put A$.

Since we want A$ to occupy screen memory, we need to know exactly where the screen memory is. Once again we need to use pointers. Memory locations 88 and 89 are the screen memory pointers. Therefore SCREENRAM=PEEK(88) +256*PEEK(89). With this done, we need to figure out the offset of the screen RAM in relation to the present address of A$. This simply means how many bytes difference there is between the two memory locations. The offset formula is OFFSET=SCREENRAM-ADR(A$).

Now that we know the offset and we know where the variable table is, we must alter that variable table so it will move A$. The pointers that locate A$ are at locations VTABLE+2 and VTABLE+3. You will notice that I don't give you specific locations because they vary depending upon the size of your program. We will call these locations V2 and V3. First we assign V3 with the formula V3-INT(OFFSET/256). Then we assign V2 with the formula V2-OFFSET -256*V3. Now we have the variables to assign our pointers, so all that is left is to POKE VTABLE+2,V2 and POKE VTABLE+3,V3.

Abracadabra, your screen is now a string or your string is now a screen. However you want to look at it, it means speed. To make things simple, here is a list of the things to do. As long as you follow them in the exact order you shouldn't have any problems.

1. DIM A$ (selected size)
2. VTABLE=PEEK(134)+256*PEEK (135)
3. SCREENRAM=PEEK(88)+256* PEEK(89)
4. OFFSET=SCREENRAM-ADR(A$)
5. V3=INT(OFFSET/256)
6. V2=OFFSET-256*V3
7. POKE VTABLE+2,V2
8. POKE VTABLE+3,V3

With all these steps completed, all you need to do is assign A$. The purpose of the list is to provide a reference while you are programming.

You are probably thinking that all of this is fine and dandy, but how to use it to do all those wonderful tricks promised? Well, to those experienced in using the Atari string operands the answers should be obvious. By adding and subtracting the right number of bytes, vertical scrolling can be achieved. For example, by adding and subtracting 40 bytes to A$ in graphic mode 0 you can have vertical scrolling. Making a high speed screen saver and multiple playfields is pretty easy. All you need to do is create a large string (not A$) and assign portions of it to A$. By changing the part of the large string assigned to A$, you can design just about anything that needs multiple screens.

A good example of this would be a graphic adventure. If you assign only parts of A$ with several different strings, you can have mixed scrolling. Again this

Program 2. Vertical coarse scroll.

```
1 REM ** MIXED SCROLLING ROUTINE **
3 REM **          WRITTEN         **
4 REM **   BY CHARLES ZUBIETA     **
5 REM
6 REM
7 REM
8 REM
9 REM DIMENSION A$
10 DIM A$(960):REM DIMENSION STRING
19 REM FIND VARIABLE TABLE
20 VTABLE=PEEK(134)+256*PEEK(135)
29 REM FIND SCREEN MEMORY
30 SCREENRAM=PEEK(88)+256*PEEK(89)
39 REM FIGURE OFFSET
40 OFFSET=SCREENRAM-ADR(A$)
49 REM FIGURE POINTERS TO FOR A$
50 V3=INT(OFFSET/256)
60 V2=OFFSET-256*V3
69 REM ASSIGN POINTERS
70 POKE VTABLE+2,V2
80 POKE VTABLE+3,V3
90 DIM M$(2900)
100 SETCOLOR 4,8,4:SETCOLOR 2,0,0:SETCOLOR 1,0,15
102 ? "↰":POKE 752,1
105 ? "  Vertical Scroll Example Program":POSITION 8,22:? "Written By
    Charles Zubieta"
106 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
107 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
108 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
109 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
110 M$(LEN(M$)+1)="♥♥press♥joystick♥up♥or♥down♥to♥scroll_♥♥"
120 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
130 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
140 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
150 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
160 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
170 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
180 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
```

```
190 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
200 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
210 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
220 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
230 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
240 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
250 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
260 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
270 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
280 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
290 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
300 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
310 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
320 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
330 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
340 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
350 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
360 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
370 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
380 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
390 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
400 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
410 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
420 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
430 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
440 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
450 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
460 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
470 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
480 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
490 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
500 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
510 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
520 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
530 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
540 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
550 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
560 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
570 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
580 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♡♡♡♡♡♡♡♡♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
590 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
600 M$(LEN(M$)+1)="♥this♥is♥an♥example♥of♥scrolling♥using♥♥"
610 M$(LEN(M$)+1)="♥a♥special♥string♥technique_♥♥♥♥♥♥♥♥♥♥♥♥"
620 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
630 M$(LEN(M$)+1)="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥"
998 REM ** PROGRAM LOGIC **
999 REM ** ST=SCROLL STEP SIZE **
1000 S=1:ST=40
1010 A$(81)=M$(S,S+799)
1015 TRAP 2000
1020 IF STICK(0)=14 THEN ST=-40
1030 IF STICK(0)=13 THEN ST=40
1035 IF STICK(0)=15 THEN ST=0
1040 D=S:S=S+ST
1050 GOTO 1010
2000 S=D:FOR D=1 TO 40:NEXT D:GOTO 1010
```

can come in very handy, especially for games. A good example of multiple scrolling would be the arcade game Frogger. Animation is easily done by creating a large string and then having A$ cycle through it to create the illusion of movement. Since this is all done at machine language speed, there is no need to worry about how many objects you want to animate. The only thing you should be concerned about is memory.

You may now be wondering what advantage this technique has over conventional page flipping and scrolling on the Atari. First of all it allows you to change as little or as much of the screen RAM as you want. There is no reason you should have to start your string with the first byte of screen memory: If you want to, you can start your string in the middle of the screen.

The second advantage is that it is totally compatible with the screen editor. This means that you can still print on the screen in Basic just as you did before. This is not possible when the location of screen RAM is changed.

The third and most significant advantage is speed. With this technique you can alter all or part of the screen at machine language speed.

So that is how it is done. It is really very easy once you get the hang of it. If you still are a little confused, then study the sample programs I have provided.

When you combine this technique with a redefined character set, player missile graphics, a modified display list, and a good imagination, you will be able to write a programs that you didn't think were possible.

After some experimenting, you will notice that like anything else, the technique has some limitations. For one thing, it is only possible to have coarse scrolling. Second, the internal character set is a problem. Don't despair: There is a way around both of these problems. As I stated earlier, the internal character set may be a blessing in disguise.

* * *

And so that is about the size of it. I am hoping we shall see more on the topic from Charles soon. As he says, the possibilities are interesting. We shall follow up, rest assured.

This is the one-year anniversary of my manning the Outpost—column 12. To celebrate, I shall continue to edit the column, but will take a bit of a vacation from writing it. Next month, Art Leyenberger will discuss the ramifications of saving graphics files from *Paint* and *MicroPainter* to Basic, and pick up the philosophical discussions with some viewpoints of his own.

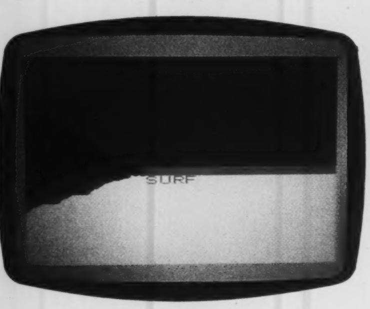
Until then, keep on Atari-ing. See you next month. ☐

rt...commodore's port...co

Julie Knott
and
Dave Prochnow

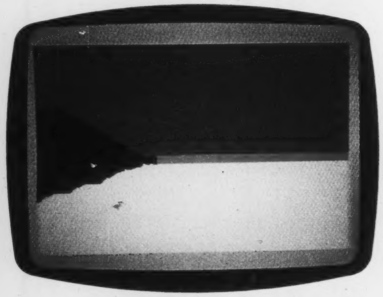
Almost everyone envies the beach dweller. The steady pulsing of the waves sets a body's time to the heartbeat of the earth. This soothing sound, along with the gentle lapping of the water at low tide or the high splashes against the rocks and sand at high tide, is enough to cause all worries of the city to be left behind. Each roar of the ocean, each recession of the tide, takes with it the cares of the day.

The memory of this beauty is transitory and easily lost in the rush of traffic on a homeward voyage, and may not be recaptured until another pilgrimage is made to the sea. If only it were possible to recreate a small portion of the essence of the beach in everyday life.



Let us break for a moment from this sea side scene. Your own trip to the beach can be accomplished with a Commodore Vic-20 computer.

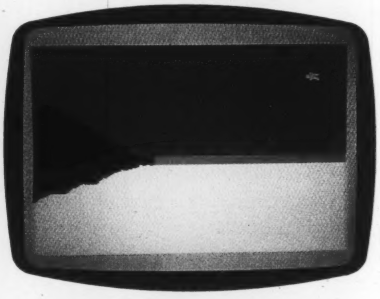
Surf makes extensive use of user-defined characters to create a realistic beach atmosphere. These custom characters eliminate the need to make do with oversized and unwieldy standard graphics that would provide less than the desired results. You must take special care in entering the DATA statements for these characters. The omission of a single number or punctuation mark could result in an address being POKEd with a value that will send your Vic into a state of shock from which it can be revived only by turning off the computer and back on.



Getting Started

Several steps must be taken to prepare the Vic for the defining of custom characters. The standard character set, which is stored in ROM, is moved into RAM so the user can shape the characters freely. Room is prepared for this move by program line 11, while the actual move occurs in line 12.

Because this action causes clutter on the screen, the border and screen colors are first set to black (line 5) and the screen is then cleared (line 10). The unfamiliar CHR$(147) in line 10 replaces the inverse heart for clearing the screen. The result is the same because CHR$(147) is the character code for CLR/HOME.



Making The Characters

Now for the creation of the actual characters. This is done by POKEing the information for a custom character into the locations that formerly stored a standard character. In Surf, custom characters are used to form the outline of a cliff that borders the beach and for the incoming tide.

Line 14 contains a FOR/NEXT loop with READ and POKE statements within

---

Julie Knott and Dave Prochnow, 706 Harrington Rd., Bellevue, NE 68005.

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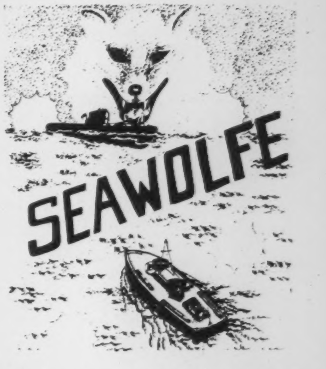

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the loop. When the program executes this line, the data for the custom characters are POKEd into RAM where characters @ through J are stored. After this happens, each time one of these characters is called upon in the program it will have this new appearance. The DATA for this metamorphosis are stored in lines 15 through 18.

The special characters are placed on the screen along with all the others that make up the sky, sea, sand, and cliff. Characters are referred to by their screen codes and placed on the screen by FOR/NEXT loops with READ and POKE statements (lines 20-30). This forms only the skeleton of the landscape, however.

Life really comes into the program in lines (33-43). This is where the colors for the sky (blue), the cliff (black) and the sea (cyan) are POKEd into their appropriate color memory locations. Screen and border colors become light yellow and white respectively after the POKE in line 55.

Colors

Custom characters are the same as regular characters in that they are composed of two colors—those of the selected screen and character colors. The selected screen and character colors for Surf are yellow and black, respectively. When the special characters that form the base of the cliff are POKEd onto the screen they appear naturally against the sand-colored screen.

However, conventional custom characters could not have been used for the top of the cliff. The black of the cliff characters would have blended in well with the rest of the cliff, but large sand-colored "steps" would have appeared above these characters where sky-blue belongs—a result of having only two colors for each character. Since this ludicrous scene was unacceptable, another method was sought to create a realistic picture.

The Vic has a multi-color mode which it can enter and allows each character to contain up to four colors. The appearance of any character on the Vic screen is determined by a binary pattern stored in character memory (the one we altered to create custom characters). In normal mode a 1 stands for the character color and a 0 stands for the screen color. Simple. In multi-color mode, the bits are controlled in pairs. Each of the four possible orders of a pair (00, 01, 10 and 11) stands for a color. So four colors can be found in a single character.

Using this method, the custom characters for the top of the cliff were assembled by color pattern rather than by shape. The screen locations where these characters appear are set to multi-color mode in lines 49 and 50. The sand-steps are eliminated and blue sky prevails!

Listing 1.

```
5 POKE 36879,8:TI$="000000"
10 PRINT CHR$(147)
11 POKE 52,29:POKE 56,29:CLR
12 FOR A=7168 TO 7431:POKE A, PEEK(A+25600):NEXT
13 POKE 36869,255
14 FOR A=7168 TO 7255:READ B:POKE A,B:NEXT
15 DATA 187,186,170,170,170,170,170,34,251,251,170,170,170,170,170,170,
255,255,255,191
16 DATA 175,171,171,170,255,255,255,255,255,255,255,255,255,254,240,192,
0,0,0,0,255,255
17 DATA 255,253,252,240,192,128,255,254,244,240,224,192,192,128,255,255,
63,31,7,1,3,1
18 DATA 252,128,128,248,128,128,128,0,0,0,0,0,0,0,0,255,255,255,255,
239,207,195,128
19 Z=3:GOSUB 90
20 FOR A=1 TO 35:READ B:READ C:POKE B,C:NEXT A
21 FOR A=1 TO 16:READ B:READ C:POKE B,C:NEXT
22 FOR A=7680 TO 7811:POKE A,3:NEXT
23 FOR A=1 TO 7
24 READ B:READ C:FOR D=B TO C:POKE D,3:NEXT D:NEXT A
25 DATA 7812,1,7813,2,7834,3,7835,3,7836,2,7856,3,7857,3,7858,3,7859,2,
7878,3,7879,3
26 DATA 7880,3,7881,3,7882,2,7900,3,7901,3,7902,3,7903,3,7904,3,7905,2,
7922,3,7923,3
27 DATA 7924,3,7925,3,7926,3,7927,3,7928,2,7944,3,7945,3,7946,3,7947,3,
7948,3,7949,3
28 DATA 7950,3,7951,0,7966,3,7967,3,7968,3,7969,3,7970,3,7971,5,7972,4,
7988,3,7989,3
29 DATA 7990,3,7991,3,7992,6,8010,3,8011,3,8012,6,8032,6,7814,7833,7837,
7855,7860,7877
30 DATA 7883,7899,7906,7921,7929,7943,7952,7965
33 FOR A=1 TO 10:READ B:READ C:FOR D=B TO C:POKE D,0:NEXT D
34 NEXT A
35 POKE 38752,0
36 FOR A=1 TO 7
37 READ B:READ C:FOR D=B TO C:POKE D,6:NEXT D
38 NEXT A
39 FOR A=38672 TO 38685:POKE A,3:NEXT
41 DATA 38532,38533,38554,38556,38576,38579,38598,38602,38620,38625,386
42,38648,38664
42 DATA 38671,38686,38692,38708,38712,38730,38733,38400,38531,38534,385
53,38557,38575
43 DATA 38580,38597,38603,38619,38626,38641,38649,38663
49 FOR A=1 TO 8:READ B:POKE (38000+B),8:NEXT
50 DATA 532,533,556,579,602,625,648,671
55 POKE 36879,249
56 FOR A=38694 TO 38697:POKE A,2:NEXT
57 FOR A=7974 TO 7977:READ B:POKE A,B:NEXT
58 DATA 19,21,18,8
```

Sound

Now that the seaside scene is set, it is time to describe the surf sound itself. Long before any of the beach appears on the screen at the start of the program, the sound of the breaking surf begins. Line 19 sends program execution to the sound subroutine beginning at line 90 and ending at 104. Two of the Vic voices, the white noise (speaker number 4) and a low tone (speaker number 1), are turned on in line 90.

The variable Z in line 91 is set prior to execution of the subroutine and establishes the number of complete wave swells that should occur. Each of these swells lasts for a random duration set in line 92. The volume of the two tones is increased and decreased using the variable I (lines 93 and 98). This varying volume value is POKEd into the volume memory location (36878).

If you have ever worked with sound on the Vic, you may be confused by the adding of 96 to the volume value. The memory location that is being POKEd with this volume information, 36878, is also affected by the use of multi-color mode. An auxiliary color for the multi-color mode is selected, in this case blue for the sky, and multiplied by 16. This number, 96, is POKEd into location 36878 right along with the selected speaker volume.

After all of this initial set-up and after three wave sounds have crashed, dawn breaks on the beach. The title, Surf, appears on the sand at the water's edge. Line 56 POKEs the color memory locations where the title appears with red. The letters themselves are POKEd onto the screen by lines 57 and 58.

The character memory locations for the character F were used for part of the bottom edge of the cliff. An alternate character had to be reformed in the shape of an F for use in the title. This alteration occurs in lines 14 through 18 along with the other characters, and this new F is used normally with the other title characters.

```
59 Z=INT(RND(1)*2)+2:GOSUB 90
60 FOR A=38694 TO 38707:POKE A,3:NEXT
61 POKE 38717,3:POKE 38718,3
62 POKE 7974,7:POKE 7975,5:POKE 7976,10:POKE 7977,7:POKE 7978,4:POKE 79
79,7:POKE 7980,5
63 POKE 7981,7:POKE 7982,4:POKE 7983,7:POKE 7984,6:POKE 7985,7:POKE 798
6,5:POKE 7987,4
64 Z=INT(RND(0)*1):GOSUB 90
68 POKE 7998,9:POKE 7997,9:FOR A=7987 TO 7975 STEP -1:POKE A,9:NEXT:POKE
7974,9
69 FOR A=1 TO 1000:NEXT
70 IF TI$>="001000" AND TI*<"001015"THEN 110
71 IF TI$>="003000" AND TI$<"003015"THEN 120
72 IF TI$>="005000" AND TI$<"005015"THEN 130
74 IF TI$>"010000" THEN 150
75 GOTO 60
90 POKE 36877,200:POKE 36874,128
91 FOR G=1 TO Z
92 H=INT(RND(1)*235)+55
93 FOR I=3 TO 15
94 POKE 36878,96+I
95 FOR J=1 TO H
96 NEXT J
97 NEXT I
98 FOR I=15 TO 3 STEP -1
99 POKE 36878,96+I
100 FOR J=1 TO H
101 NEXT J
102 NEXT I
103 NEXT G
104 RETURN
110 POKE 38703,2
111 FOR A=7256 TO 7263:READ B:POKE A,B:NEXT
112 DATA 8,28,62,124,56,16,0,0
113 POKE 7983,11:Z=4:GOSUB 90
114 GOTO 60
120 FOR A=7264 TO 7279:READ B:POKE A,B:NEXT
121 DATA 24,28,18,112,240,224,32,32,24,28,18,112,240,224,80,136
122 FOR A=38774 TO 38795:POKE A,5:NEXT
123 C=0:E=8054:FOR A=1 TO 21:POKE(E+C),12:Z=1:GOSUB 90:POKE(E+C),13
124 FOR F=1 TO 100:NEXT F:POKE(E+C),9:C=C+1:NEXT A
125 GOTO 60
130 FOR A=38466 TO 38487:POKE A,9:NEXT
131 FOR A=7280 TO 7287:READ B:POKE A,B:NEXT
132 DATA 223,213,85,87,85,213,221,255
133 FOR A=7767 TO 7746 STEP -1:POKE A,14:Z=2:GOSUB 90:POKE A,3:NEXT
134 GOTO 60
150 FOR A=38400 TO 38905:POKE A,0:NEXT:Z=2:GOSUB 90:RUN
```

The waves themselves are created in lines 60 through 63. The screen locations where the wave washes up on the shore are POKEd with cyan in lines 60 and 61, and the characters that form the wave are POKEd onto the screen in lines 62 and 63. The visual appearance of the wave corresponds with its sound.

After the water washes up on the shore, line 64 sends program execution to the sound subroutine (line 90), and when this has been completed the wave is erased by line 68.

Timing

In one hour Surf will cycle through a complete day of common beach behavior—from dawn to dusk. Within the Vic is a real time clock that may be controlled by the variable TI$. At the beginning of Surf, this variable is set to 000000. As the program progresses, different vignettes occur on the screen. Lines 70 through 74 check to see how the time is advancing and, if appropriate, will send execution of the program to one of these subroutines.

Ten minutes into the program, line 70 will send program execution to line 110. A pop can is washed up onto the shore and then taken back out to sea to litter the ocean.

Later, at the half hour point, line 71 transfers the program to line 120 where a sea bird is made to hop into view. Lines 120 and 121 create two figures of the bird. The strip of screen across which the bird struts is set to green in line 122. This area retains its yellow beach color and only appears green in the location of the bird figure. Lines 123 and 124 first print a standing bird figure on the screen. The bird stands for the duration of one wave sound and is then replaced by a hopping bird figure. There is a slight delay to allow a viewer's eye to see the hop, and then this screen location is POKEd with an empty space. The bird jumps to the next space and on across the screen.

Just as at a real beach, clouds appear in the sky of our computer beach as the day draws to a close. At 50 minutes into the program line 72 reads the value of TI$ to be greater than or equal to 005000 and program execution falls to line 130. This line sets a row of screen locations across the sky to multi-color mode. Again, this mode was chosen to allow colors other than those of the border and screen to be used to create the cloud. The figure itself is formed in lines 131 and 132. The cloud floats lazily across the sky as dictated by line 133, with two swells of the surf occurring between each screen animation jump.

Each of the characters—the pop can, the bird, and the cloud—is approximately the same size, but this should not be considered unusual. All are completely in proportion in relation to where they occur on the screen, giving a greater feeling of depth to the beach scene. The bird appears large in the foreground while the smaller, distant cloud passes in the background.

The large gap in the program listing between line 134 and line 150 was reserved for yet another scenic diversion. It was planned to present a ship passing across the horizon, but memory limitations prevented the smooth execution of this animation. For one thing, the ship seemed to skim across the very top of the water, and for another, as soon as the ship reached the cliff, it appeared to be beached. Rather than letting the poor ship run aground on our beach, it was decided to let it rest, more safely, in our imaginations.

Finally, dusk falls on the beach at the end of the day. Line 74 detects this and sends the program on to line 150. Night covers the beach, leaving only shadows and headlights on the cliff and shore. All of the locations in color memory are POKEd with black, leaving only the multicolor spaces with some sand color in them. The duration of this night is the time it takes for two wave swells. On returning from the surf sound subroutine the RUN statement is issued, resetting the TI$ clock to 000000 and beginning the entire process again.

After carefully entering Surf, type RUN, press RETURN and get ready for the mind-soothing, lulling action of waves crashing on your private coast. Surf will continue to run until you either press and hold the RUN/STOP key while pressing the RESTORE key or turn the Vic off. Remember, if you elect to turn the Vic off Surf is lost unless you recorded the program on a cassette tape (or disk).

Of course you could re-type the entire program every time that you want to use it. But, a wiser decision would be to purchase the Commodore cassette recorder and make a permanent cassette copy. Then when the winter winds begin to howl you can quickly transport your thoughts to your own isolated, sun drenched computer beach. ☐

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Susan Glinert-Cole

The column is a bit terser this month, as we have been occupied with moving to warmer parts of the country. There is a subtle irony behind this upheaval, which may be gently described as Will Fastie's idea of a final revenge. As I am now working for him, it remains to be seen to whom the final revenge will be awarded.

The computer will enjoy the freedom from woodsmoke (as will the rest of us). I have been mildly insistent, at the top of my lungs, about the next house having absolutely no flue, chimney, thimble, fireplace, woodstove, or any object which needs to be fed every few hours with things which deposit bark particles and confused ants on the floor.

For the first time in years I can look forward to October weekends. Hitherto they have been occupied with standing on top of ten cords of renewable resource with a 16" chainsaw or staggering under a load of same renewable resource on the way to the barn. Now you know why I don't have any energy left over to swap disks. I am hoping that a more benevolent climate will leave me with enough vigor to cope with a three pass compiler.

More on the NEC 8023A

There has been so much mail about the NEC 8023A printer the past few months that it is time I responded in a more constructive manner than that of putting the letters carefully away in the filing cabinet. First, there is the matter of printer ink. The suggestion regarding the use of stamp pad ink to rejuvenate the cartridge rollers drew gasps of horror from a few people.

They maintain that stamp pad ink does not contain the proper lubricants for dot matrix printheads and would therefore do much damage if used. This may very well be true; I am not by any means an expert in the area. I used the stamp pad ink approach for about eight months, and my printer has not appeared to suffer from this abuse.

For the wary, however, ink of the proper quality for dot matrix ribbons may be ordered from Ben Torres Ribbon Service. An alternative to constantly reinking ribbons is to squirt the ribbon with WD-40 and allow the ribbon to dry for a few hours with the cover off. I tried this about a year ago before I discovered stamp pad ink and it works well on a one-time only basis. The next ribbon drenching ceremony should feature some sort of ink, as the WD-40 is merely a one-shot rejuvenator.

Next, the mystery of the Ctrl + PrtSc command was solved by several people. Switch 1-7 should be set to the ON (closed) position. The PrtSc function will work perfectly, and other printed files, such as Basic listings and word processor printouts, will not have the extra linefeed (see below).

The manual that came with my printer was not exactly a prototype of limpid prose. I think it was written in Japanese and then translated, word by word, into English. The fact that all the examples are for the NEC personal computer didn't help either. For the record, then, here are the functions reserved for the two DIP switches.

Switches 1-1, 1-2, and 1-3 are used to select the appropriate character set, depending on which country you are presently residing in (or feel like writing in). If they are all off, the Japanese character set is selected; the correct setting for the United States is OFF ON OFF respectively.

If the British character set is selected by setting Switch 1-1 ON, the # sign on the keyboard becomes the £ sign. Setting the switches as described in the manual for the German and Swedish character sets will sprinkle umlauts throughout the text.

A table in the back of the manual shows the replacement characters applicable to each character set. Switch 1-4 determines how many lines are on a page for the Top of Form character. The default setting is OFF for 66 lines; if you prefer legal sized paper, setting it ON will set 72 lines per page as the default.

Switch 1-5 should be OFF. This allows you to select or deselect the printer from the keyboard or a program by sending a CHR$(17) for select or a CHR$(19) for deselect. These signals are equivalent to pressing the SELECT switch on the front of the printer. If this switch is turned ON, these characters will be ignored by the NEC.

Switches 1-6, 1-7, and 1-8 determine what happens at the end of a print line. The factory settings are: ON OFF OFF respectively. Ctrl + PrtSc will have the

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Susan Glinert-Cole, Suite 211, World Trade Center, Baltimore, MD 21202. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided.

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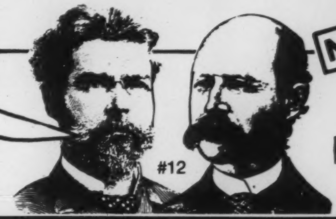

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10 HGR2:
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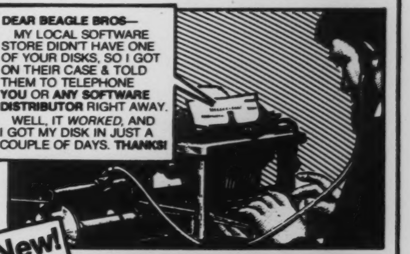
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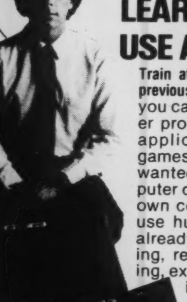

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IBM Images, continued...

effect of printing everything on one line, although output from my word processor is correct. As stated above, setting Switch 1-7 ON will correct this problem.

For the curious, the various permutations are:

OFF OFF OFF: All output is printed on one line.

OFF OFF ON: Inserts an extra carriage return/linefeed; word processor output is double spaced but PrtSc is correct.

OFF ON OFF: Both the word processor and PrtSc do a correct page print.

OFF ON ON: Extra carriage return/linefeed inserted in both PrtSc and other output.

ON OFF OFF: PrtSc prints on one line but word processor output is correct.

ON OFF ON: Extra carriage return/linefeed in word processor output, but PrtSc is correct.

ON ON OFF: Both PrTSc and other output are correct.

ON ON ON: Extra carriage return/linefeed in both PrtSc and other output.

Switch 2-1 determines whether you have a slash through the zero. This is a matter of taste; if you are a slasher, set Switch 2-1 ON. Switches 2-2, 2-3, and 2-4 are particularly useful if more than one printer is being driven from the same port and you wish to send information to a specific device. Normally, Switch 2-2 is OFF; turning it ON assigns each printer a device address as determined by Switches 2-3 and 2-4.

Since two switches are allotted to address specification, up to four (two squared) devices may be used in this manner. An address is enabled with Esc + a-d, where a is device 0, b is device 1, and so on. When using this mode, the printer(s) must be on-line, that is, the SELECT light must be lit. The appropriate escape code as described above will then activate the designated device.

Switch 2-5 determines the default typeface when the printer is turned on. The default (OFF) is pica; proportional printing is selected if 2-5 is turned on. Switch 2-6 selects 7- or 8-bit data. This should be OFF (8-bit) for the IBM. Switch 2-7 determines whether the printer is in the selected state at power-up (e.g. puts the printer on-line). This should be ON, for select. The factory setting is OFF, which means you have to press the SELECT switch every time you turn on the printer, something you may not remember to do or want to be bothered with.

Printer Formatting Program

Several months ago I promised a Basic version of the printer formatting program which originally appeared in USCD Pascal. Wait no longer. Here it is in *two* different versions. The fundamental premise, as in the original, is to conveniently send codes to the printer from inside of a file to make the output look resplendent, exotic, or what have you. The first (Listing 1), short program is very simple, and can be easily adapted to any other printer by simply changing the codes in lines 4700-6000. Other, more elaborate functions can also be added—horizontal and vertical tabs for example. The program is organized in a manner commensurate with customization. Options such as double spacing or page number subroutines can be worked in around lines 840-940.

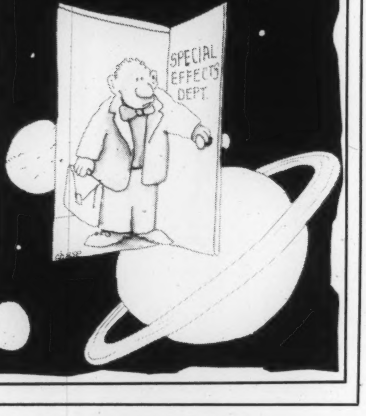
Somewhere around lines 4000-4600 I intend to insert a routine which will recognize the REM string and print these lines in a different typeface for added readability in a program listing. This version of the program was deliberately kept short and moderately generic so that other printers may be accommodated too.

Figure 1.

Bit 7 →	0	0	0	1	0	0	0	0	← Bit 0
pin #	11	10	12	13	15	–	–	–	

Line 545 deserves some comment. When I wrote the program, I originally used the command LPRINT to send all codes to the printer. This resulted in an extra linefeed being inserted after every line of the file. It took me a while to find the cause of this, because the Basic manual misspoke on the subject.

It claims that Basic will send an extra carriage return/linefeed after printing 80 characters unless the statement is ended with a semicolon.



In fact, Basic seems to print the extra cr/lf pair regardless; it blithely ignored the semicolons and casually double spaced everything anyway. Specifying a WIDTH:"LPT1:",255 will disable line folding. In the interest of generality, the final version opens "LPT1:" as a file and printing the character codes to it. This allows the output to be directed to any file (disk, communications, and so on) by changing "LPT1:" to the desired file name.

The program takes each character in the specified file and checks to see if it is the start of a printer command. If so, the program goes to a routine which reads the code sequence into CODE$ and then sends it to the printer.

The printer commands are recognized by square brackets ([]), but these may be changed in lines 1080 and 4080. If your preference, for example, is to put the commands on separate lines, make the termination character a carriage return (CHR$(13)).

The WAIT statement in line 6900 is a very useful command. Many routines which deal with printer errors simply make the computer do some mindless arithmetic while the operator is supposed to be turning on the printer. This is not very elegant, and, as you might have suspected by now, there is a better way.

The improved method instructs the computer to twiddle its thumbs until it receives a SELECT signal from the printer. The trick in implementing the WAIT was to locate both the proper port number to poll and the correct series of bits which would be recognized as the SELECT signal. This information can be found by a close reading of pages 2-72 and 2-73 in the Technical Reference Manual. The SELECT signal travels on pin 13 of the printer adapter connector via port (address) 378H.

There are, as usual, eight bits sent to the computer in this byte and we are interested in having the computer wait around until pin 13 becomes active (ON or 1). The signal byte we wait for therefore looks like Figure 1.

Those of you who took last month's column to heart will instantly recognize 00010000 as 2, or 32 decimal. Line 6900 thus specifies that the computer wait until 00010000 appears at port 379H. (Note: if there is an IBM monochrome display/printer adapter board in use, the correct address is 3BDH).

There appeared, from the letters I received, to be some confusion about the printer codes themselves. One problem is that some of the codes must be prefaced by an escape character (CHR$(27)), while others may not be so preceded. This is manifested, for example, with the

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double wide typeface: this is invoked with CHR$(14) with *no* escape code. Similarly, the Top of Form character (CHR$(12)) must travel alone. The documentation does not make this terribly clear, but there it is. Lines 4700-6000 present all the codes for typefaces and line spacing for the NEC.

The Long Form

The second (Listing 2), long version of this formatter has some extremely pleasant features added to it, and it should be emphasized again that both of these programs lend themselves to customization to other printers and even other computers (heaven forbid).

With this program it is possible to take full advantage of the extended character set that the NEC 8023A provides. This printer will print, for example, all digits from 0 to 9 as superscripts. It is therefore possible, in theory, to print attractive mathematical formulas.

The problem is always that what you see on the display is not necessarily what is printed to the printer; this can add extra confusion to an already complicated output line. In this program, a number to be superscripted is preceded by a tilde (CHR$(126)). Being able to view the number to be superscripted makes it much easier to proofread a page of formulas on the screen and is obviously more meaningful than random, unusual characters. Because the program allows superscripts of any size, it can also be used for simple footnoting.

I have long been bothered by the fact that the IBM and the NEC printer have completely different assignments for the extended character set, so even if there are characters common to both sets, it is difficult to do things like design forms on the display. This problem is addressed in the long version of the formatting program, which will correctly translate on-screen characters to the corresponding NEC extended ASCII code.

The translating table works perfectly for characters that are identical (Greek letters and some math symbols for example). There are characters which are found in the IBM set which must be composed from symbols in the NEC set—some of the graphic symbols and foreign letters for example. This was done by working out the sequence of character codes for the composed symbol. The character é is made up of three character codes: CHR$(101) for the e, a CHR$(8) for a backspace, and CHR$(44) for the accent mark.

Some characters in the IBM set cannot be done with the NEC, but surprisingly, most of them can be built with a little twiddling. In some cases, the composed character is not exactly equivalent, and you may prefer some other representation than the one output by this program.

The translating table is set up as a 127 × 4 array and can thus contain codes for 127 characters composed of up to four keystrokes each. If a character code greater than ASCII 127 is found in the file, the program routes to the conversion routine in line 12000.

Since it isn't possible to have the array begin with a subscript of 128, the first line of the subroutine subtracts 127 from the ASCII code value to find the corresponding row. Thus the character é, which in IBM ASCII is CHR$(130), is found in row 3. The DATA statement on line 15050, will, if carefully dissected by fours, will show the third set of data to be 131, 8, 39, 0. The routine then prints all these characters to the printer and, voilà, what you see when you enter an é in your file is actually what you get on the printer. For those characters for which there was no hope of possible correspondence between the NEC and the IBM, the data table simply contains four zeroes; you can make up your own characters and insert them as you please. Naturally, if you own a different printer, you will have to produce a different data table but the principle still applies.

One note with this program: the NEC will only recognize a backspace character when in the incremental mode (the default is the logic seeking mode). This means that instead of seeking the shortest distance to the next character, the printhead automatically returns to the lefthand margin after receiving a carriage return. Printing is therefore unidirectional and it takes about twice as long as usual to print out a file.

If you do not intend to use any of the composed characters which contain a backspace and prefer a more energetic printing pace, remove line 553. The program, by the way, has not been optimized for speed in any way and I suggest that some care be taken if you intend to use it. In its present condition, with all the REM statements and long variable names, it takes forever to initialize.

Vertical Tabbing

Another peculiarity of the NEC was brought to my attention by John Widman. The vertical form unit (VFU), which allows vertical tabbing for printing forms, will not load correctly unless the propensity of Basic to add the extra lf/cr after 80 characters is defeated with the following statement:

```
WIDTH ''LPT1:'', 255
```

I know, I promised something on the 8087 and the p-system this month but what with the packing and yard sales and all of the other details that go into relocation, not to mention the new game from Funtastic, there just wasn't time to do that too. Next month for almost sure and while I am on the subject of next month, if there are topics you would like to see in this column, please let me know.

I have been trying to strike a balance between reviews and more generally applicable topics, while still addressing less recognized systems. This philosophy is intended to enlighten the novice, but keep the more advanced user attentive. An excoriating or approving letter will let me know if the novices are bewildered and the rest of the audience fast asleep.

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Listing 1.

```
10 '        <<<<<<  FORMAT PROGRAM FOR NEC 8023A PRINTER  >>>>>
20 '                       SUSAN GLINERT-COLE
100 '
101 '
200 '                <<<<<  INSTRUCTIONS  >>>>>
210 '
220 ' Printer codes may be imbedded into any text file as follows:
230 '   1.  codes must be enclosed in square brackets
240 '   2.  each code must be enclosed in separate brackets
250 '   3.  to cancel a code, simply precede the code with a minus sign
260 '   4.  codes may be placed anywhere on a line
265 '   5.  codes may be in upper or lower case
266 '   6.  left margin may be one or two digits
267 '   7.  variable line spacing may be one or two digits
270 '
275 '
280 '                       EXAMPLES
282 '
290 '           [b]     turns on bold face
295 '           [c]     turns on condensed face
300 '           [p]     turns on proportional face
310 '           [e]     turns on elite face
320 '           [u]     turns on underlining
330 '           [d]     turns on double wide printing
340 '           [t]     prints a 'top of form' command
350 '           [n]     turns on pica face
360 '           [Lxx]   sets left margin at xx
370 '           [Xxx]   sets line spacing to xx/144
380 '           [1/6]   sets line spacing to 6 per inch
390 '           [1/8]   sets line spacing to 8 per inch
400 '           [-c]    cancels condensed face (pica is the default)
490 '
495 '
498 '------------------------------------------------------------------------
499 '
500 '           <<<<<<            INITIALIZE          >>>>>>
520 '
525 BLANK$=SPACE$(30)
530 ESC$=CHR$(27)
535 CLS
537 LINES = 4                                  'counter for page length
538 TRUE = -1:FALSE = 0
540 COLOR 2,0                                          'green letters/black bkrnd
545 WIDTH "LPT1:",255                                  'defeat extra cr/lf
550 ON ERROR GOTO 6200
600 '
798 '------------------------------------------------------------------------
799 '
800 '                 <<<<<<      GET THE FILE NAME       >>>>>>
801 '
820 LOCATE 11,41:PRINT BLANK$;
830 LOCATE 11,25:LINE INPUT;"ENTER FILE NAME:  ";FILE$
835 OPEN FILE$ FOR INPUT AS #1
837 OPEN "LPT1:" AS #2
838 '
840 '------------------------------------------------------------------------
842 '
845 '                 <<<<<<      GET OTHER CHOICES    >>>>>>
846 '
850 LOCATE 13,25:LINE INPUT;"SKIP PERFORATIONS? (Y/N)  ";AN$
860 IF AN$="Y" OR AN$="y" THEN SKIP = TRUE ELSE SKIP = FALSE
870 IF NOT SKIP THEN GOTO 1000
880 LOCATE 15,25:  PRINT"=====> PLACE TOP OF FORM UNDER PAPER BAIL"
890 LOCATE 16, 25: PRINT "=====> THEN PRESS ANY KEY TO CONTINUE"
895 IF INKEY$="" THEN 895
900 FOR X= 1 TO 4:PRINT #2,CHR$(10):NEXT                  '4 blank lines at top
937 '
940 '------------------------------------------------------------------------
941 '
1000 '                 <<<<<<      GET EACH CHARACTER     >>>>>>
1020 '
1030 WHILE NOT EOF(1)
1060      CHAR$=INPUT$(1,#1)
1080      IF CHAR$="[" THEN GOSUB 4000  ELSE PRINT #2,CHAR$;
1090      IF CHAR$= CHR$(13) THEN LINES = LINES + 1
2000 IF LINES = 58 AND SKIP = TRUE THEN GOSUB 8000
2050 WEND
2051 '
3000 '------------------------------------------------------------------------

3040 '
3050 PRINT "ALL DONE"
3060 END
```

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CIRCLE 187 ON READER SERVICE CARD

IBM Images, continued...

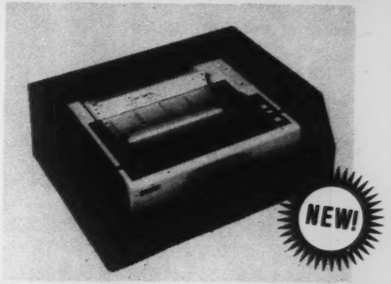
```
3995 '---------------------------------------------------------------------

3996 '---------------------------------------------------------------------

3997 '
3998 '              <<<<<<     GET PRINTER CODES     >>>>>>
3999 '
4000 CODE$=""                                          'initialize CODE$
4050 CHAR$=INPUT$(1,#1)
4080 WHILE CHAR$ <> "]"
4100    CODE$=COBE$+CHAR$:GOTO 4050                    'get the whole code
4200 WEND
4500 GOSUB 4700                                        'send code to printer
4600 RETURN
4610 '
4696 '-------------------------------------------------------------------
4697 '
4698              <<<<<<     SEND CODES TO PRINTER     >>>>>>
4699 '
4700 IF CODE$="t" OR CODE$="T" THEN PRINT #2, CHR$(12);       'top of form
4703 IF RIGHT$(CODE$,1) <> "D" AND RIGHT$(CODE$,1) <> "d"
        THEN PRINT #2,CHR$(27);
4705 IF LEFT$(CODE$,1)="-" THEN GOTO 4900                     'cancel code
4710 IF CODE$="d" OR CODE$="D" THEN PRINT #2, CHR$(14);       'double wide
4720 IF CODE$="c" OR CODE$="C" THEN PRINT #2, CHR$(81);       'condensed
4730 IF CODE$="p" OR CODE$="P" THEN PRINT #2, CHR$(80);       'proportional
4740 IF CODE$="e" OR CODE$="E" THEN PRINT #2, CHR$(69);       'elite
4770 IF CODE$="b" OR CODE$="B" THEN PRINT #2, CHR$(33);       'bold
4780 IF CODE$="n" OR CODE$="N" THEN PRINT #2, CHR$(78);       'pica
4790 IF CODE$="1/8" THEN PRINT #2, CHR$(66);                  '8 lpi
4800 IF CODE$="1/6" THEN PRINT #2, CHR$(65);                  '6 lpi
4830 IF LEFT$(CODE$,1)="L" OR LEFT$(CODE$,1)="l" THEN 4960    'do left margin
4850 IF LEFT$(CODE$,1)="x" OR LEFT$(CODE$,1)="X" THEN 4980    'do line spcng
4860 RETURN
4862 '
4885 '-------------------------------------------------------------------
4886 '
4887 '             <<<<<  CANCEL CODES   >>>>>
4889 '
4900 IF CODE$="-d" OR CODE$="-D" THEN PRINT #2, CHR$(15);      'cancel double
4910 IF CODE$="-p" OR CODE$="-P" THEN PRINT #2, CHR$(78);      'return to pica
4920 IF CODE$="-e" OR CODE$="-E" THEN PRINT #2, CHR$(78);      'return to pica
4930 IF CODE$="-b" OR CODE$="-B" THEN PRINT #2, CHR$(34);      'cancel bold
4940 IF CODE$="-u" OR CODE$="-U" THEN PRINT #2, CHR$(89);      'cancel undrlne
4949 RETURN
4950 '
4954 '-------------------------------------------------------------------
4956 '
4957 '             <<<<<  SET LEFT MARGIN    >>>>>
4958 '
4960 IF LEN(CODE$)=2 THEN PRINT #2, CHR$(76);"00";RIGHT$(CODE$,1);
4970 IF LEN(CODE$)=3 THEN PRINT #2, CHR$(76);"0";RIGHT$(CODE$,2);
4975 RETURN
4976 '
4977 '-------------------------------------------------------------------
4978 '             <<<<<  SET LINE SPACING   >>>>>
4979 '
4980 IF LEN(CODE$)=2 THEN PRINT #2, CHR$(84);"0";RIGHT$(CODE$,1);
4990 IF LEN(CODE$)=3 THEN PRINT #2, CHR$(84);RIGHT$(CODE$,2);
4995 RETURN
4999 '
6000 '------------------------------------------------------------------
6050 '
6100 '              <<<<<<  ERROR TRAPPING ROUTINES  >>>>>>
6101 '
6200 LOCATE 23,30:COLOR 0,2
6300 IF ERR=53 THEN PRINT "file not found";
6400 IF ERR=71 THEN PRINT "disk not ready";
6500 IF ERR=25 THEN PRINT "turn on the printer";
6600 IF ERR=27 THEN PRINT "out of paper";
6700 COLOR 2,0
6800 IF ERR=53 OR ERR=71 THEN RESUME 540
6900 IF ERR=24 OR ERR=25 OR ERR=27 THEN WAIT &H379,32   'wait for select signal
7000 RESUME 1060
7995 '
7996 '-------------------------------------------------------------------

7997 '              <<<<<<      SKIP TO NEXT PAGE      >>>>>>
7998 '
8000 FOR X = 1 TO 10
8010     PRINT #2,CHR$(10)
8020 NEXT X
8030 LINES = 4                                  'reset lines counter
8040 RETURN
```

Epson, OKI, IDS, NEC, Diablo, Qume



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CIRCLE 240 ON READER SERVICE CARD

IBM Images, continued...

Listing 2.

```
10 '        <<<<<<  FORMAT PROGRAM FOR NEC 8023A PRINTER  >>>>>
20 '                          SUSAN GLINERT-COLE
100 '
101 '
200 '                  <<<<<  INSTRUCTIONS  >>>>>
210 '
220 ' Printer codes may be imbedded into any text file as follows:
230 '   1.  codes must be enclosed in square brackets
240 '   2.  each code must be enclosed in separate brackets
250 '   3.  to cancel a code, simply precede the code with a minus sign
260 '   4.  codes may be placed anywhere on a line
265 '   5.  codes may be in upper or lower case
266 '   6.  left margin may be one or two digits
267 '   7.  variable line spacing may be one or two digits
268 '   8.  superscripts may be invoked by preceding them with a '  '
270 '
275 '
280 '                         EXAMPLES
282 '
290 '            [b]     turns on bold face
295 '            [c]     turns on condensed face
300 '            [p]     turns on proportional face
310 '            [e]     turns on elite face
320 '            [u]     turns on underlining
330 '            [d]     turns on double wide printing
340 '            [t]     prints a 'top of form' command
350 '            [n]     turns on pica face
360 '            [Lxx]   sets left margin at xx
370 '            [Xxx]   sets line spacing to xx/144
380 '            [1/6]   sets line spacing to 6 per inch
390 '            [1/8]   sets line spacing to 8 per inch
400 '            [-c]    cancels condensed face (pica is the default)
405 '            12~ 5   prints 12 to the fifth power
490 '
495 '
498 '-----------------------------------------------------------------------
499 '
500 '                <<<<<<           INITIALIZE         >>>>>>
520 '
530 ESC$=CHR$(27)
535 CLS
537 LINES = 4                                        'counter for page length
538 TRUE = -1:FALSE = 0
540 COLOR 2,0                                        'green letters/black bkrnd
545 WIDTH "LPT1:",255                                'defeat extra cr/lf
550 ON ERROR GOTO 6200
551 '
552 ' put printer in incremental mode to enable backspacing
553 LPRINT ESC$;CHR$(91);
560 '
565 DIM POWER(10)                           'superscript table
570 FOR P = 1 TO 10
580   READ POWER(P)
590 NEXT P
595 '
600 '
700 '
705 DIM TABLE  (127,4)
710 FOR ROW = 1 TO 127
720   FOR COL = 1 TO 4
730      READ TABLE (ROW,COL)
740   NEXT COL
750 NEXT ROW
751 '
752 ON ERROR GOTO 6200
798 '-----------------------------------------------------------------------
799 '
800 '              <<<<<<      GET THE FILE NAME       >>>>>>
801 '
820 LOCATE 11,41:PRINT BLANK$;
830 LOCATE 11,25:LINE INPUT;"ENTER FILE NAME:  ";FILE$
835 OPEN FILE$ FOR INPUT AS #1
837 OPEN "LPT1:" AS #2
838 '
840 '-----------------------------------------------------------------------
842 '
845 '              <<<<<<      GET OTHER CHOICES    >>>>>>
846 '
850 LOCATE 13,25:LINE INPUT;"SKIP PERFORATIONS? (Y/N)  ";AN$
860 IF AN$="Y" OR AN$="y" THEN SKIP = TRUE ELSE SKIP = FALSE
870 IF NOT SKIP THEN GOTO 1000
880 LOCATE 15,25:  PRINT"=====> PLACE TOP OF FORM UNDER PAPER BAIL"
890 LOCATE 16, 25: PRINT "=====> THEN PRESS ANY KEY TO CONTINUE"
895 IF INKEY$="" THEN 895
900 FOR X= 1 TO 4:PRINT #2,CHR$(10):NEXT                  '4 blank lines at top
937 '
940 '-----------------------------------------------------------------------
941 '
1000 '              <<<<<<      GET EACH CHARACTER     >>>>>>
1020 '
1030 WHILE NOT EOF(1)
1040    CHAR$= INPUT$(1,#1)
1050     IF CHAR$ <> "["  AND CHAR$ <> "~" AND ASC(CHAR$) <128
            THEN  PRINT #2, CHAR$;:GOTO 2010
1060     IF CHAR$ = "~" THEN GOSUB 10000                    'do superscripts
1070     IF ASC(CHAR$) >127 THEN GOSUB 12000                ' do table
2000     IF CHAR$ = "[" THEN GOSUB 4000                     'do typefaces
2005 '
2010     IF CHAR$= CHR$(13) THEN LINES = LINES + 1        'increment line #
2020     IF LINES = 58 AND SKIP = TRUE THEN GOSUB 8000    'do top of form
2051 '
2090 WEND
3000 '-----------------------------------------------------------------------
3040 '
3050 PRINT "ALL DONE"
3060 END
3995 '-----------------------------------------------------------------------
3996 '------------------------------------------------------------------------
3997 '
3998 '              <<<<<<      GET PRINTER CODES     >>>>>>
3999 '
4000 CODE$=""                                            'initialize CODE$
4050 CHAR$=INPUT$(1,#1)
4080 WHILE CHAR$ <> "]"
4100    CODE$=CODE$+CHAR$:GOTO 4050                      'get the whole code
4200 WEND
4500 GOSUB 4700                                          'send code to printer
4600 RETURN
4610 '
4696 '-----------------------------------------------------------------------
4697 '
4698               <<<<<<     SEND CODES TO PRINTER     >>>>>>
4699 '
4700 IF CODE$="t" OR CODE$="T" THEN PRINT #2, CHR$(12);       'top of form
4703 IF RIGHT$(CODE$,1) <> "D" AND RIGHT$(CODE$,1) <> "d"
       THEN PRINT #2, ESC$;
4705 IF LEFT$(CODE$,1)="-" THEN GOTO 4900                    'cancel code
4710 IF CODE$="d" OR CODE$="D" THEN PRINT #2, CHR$(14);       'double wide
4720 IF CODE$="c" OR CODE$="C" THEN PRINT #2, CHR$(81);       'condensed
4730 IF CODE$="p" OR CODE$="P" THEN PRINT #2, CHR$(80);       'proportional
4740 IF CODE$="e" OR CODE$="E" THEN PRINT #2, CHR$(69);       'elite
4770 IF CODE$="b" OR CODE$="B" THEN PRINT #2, CHR$(33);       'bold
4780 IF CODE$="n" OR CODE$="N" THEN PRINT #2, CHR$(78);       'pica
4790 IF CODE$="1/8" THEN PRINT #2, CHR$(66);                  '8 lpi
4800 IF CODE$="1/6" THEN PRINT #2, CHR$(65);                  '6 lpi
4830 IF LEFT$(CODE$,1)="L" OR LEFT$(CODE$,1)="l" THEN 4960    'do left margin
4850 IF LEFT$(CODE$,1)="x" OR LEFT$(CODE$,1)="X" THEN 4980    'do line spcng
4860 RETURN
4862 '
4885 '-----------------------------------------------------------------------
4886 '
4887 '              <<<<<  CANCEL CODES   >>>>>
4889 '
4900 IF CODE$="-d" OR CODE$="-D" THEN PRINT #2, CHR$(15);      'cancel double
4910 IF CODE$="-p" OR CODE$="-P" THEN PRINT #2, CHR$(78);      'return to pica
4920 IF CODE$="-e" OR CODE$="-E" THEN PRINT #2, CHR$(78);      'return to pica
4930 IF CODE$="-b" OR CODE$="-B" THEN PRINT #2, CHR$(34);      'cancel bold
4940 IF CODE$="-u" OR CODE$="-U" THEN PRINT #2, CHR$(89);      'cancel undrlne
4949 RETURN
4950 '
4954 '-----------------------------------------------------------------------
4956 '
4957 '              <<<<<  SET LEFT MARGIN    >>>>>
4958 '
4960 IF LEN(CODE$)=2 THEN PRINT #2, CHR$(76);"00";RIGHT$(CODE$,1);
4970 IF LEN(CODE$)=3 THEN PRINT #2, CHR$(76);"0";RIGHT$(CODE$,2);
4975 RETURN
4976 '
4977 '-----------------------------------------------------------------------
4978 '              <<<<<  SET LINE SPACING   >>>>>
4979 '
4980 IF LEN(CODE$)=2 THEN PRINT #2, CHR$(84);"0";RIGHT$(CODE$,1);
4990 IF LEN(CODE$)=3 THEN PRINT #2, CHR$(84);RIGHT$(CODE$,2);
4995 RETURN
4999 '
6000 '----------------------------------------------------------------------
6050 '
6100 '                <<<<<<  ERROR TRAPPING ROUTINES  >>>>>>
6101 '
6200 LOCATE 23,30:COLOR 0,2
6300 IF ERR=53 THEN PRINT "file not found";
6400 IF ERR=71 THEN PRINT "disk not ready";
6500 IF ERR=25 THEN PRINT "turn on the printer";
6600 IF ERR=27 THEN PRINT "out of paper";
6700 COLOR 2,0
6800 IF ERR=53 OR ERR=71 THEN RESUME 540
6900 IF ERR=24 OR ERR=25 OR ERR=27 THEN WAIT &H379,32   'wait for select signal
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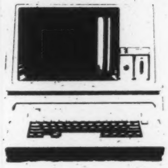

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Z-Card II	169	133
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	list price	our price
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Prowriter II	995	643
Starwriter	1895	1165
Printmaster	1995	1475
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Gemini 10X special	**499**	**293**
Gemini 15	649	457
STS-80	199	169
Delta	please	call
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ML-82	549	387
ML-83	899	619
ML-84P	1395	975
ML-92 (special)	**699**	**493**
ML-93	1249	853
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TP-I	895	487
Tractor feed	149	119
Transtar		
Color-315 (color printer)	599	463
Others		
Gorilla printer	250	197
Epson		CALL
Diablo		and
NEC		SAVE

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USI		
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K9-12n-uy	189	137
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Smartmodem 1200	699	493
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SSM		
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Transend 3	275	198
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Micro-Sci		
A2 (special)	**345**	**229**
A40	379	269
A70	529	349
w/controller		call
Others		
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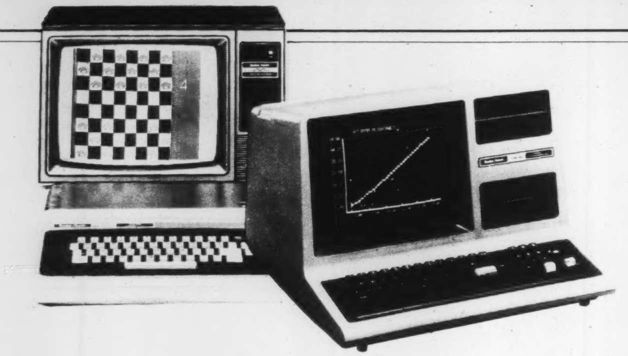


rings...trs-80 strings...trs-8

Stephen B. Gray

At the fifty-sixth step on the TRS-80 stairway to personal computing, we take a quick look at the MC-10 Color Computer, seven PC-1 Pocket Computer programs from Radio Shack, the *Clean Slate* word processor from Sams, the *QWERTY 3.0* word processor from ScreenPlay and a short program for computing the day of the week.

A Little Brother

The TRS-80 MC-10, introduced in May, is also known as the TRS-80 Micro Color Computer because it takes up only about as much space as a 700-page novel, or about a sixth the space of the Color Computer. It weighs only 29.5 ounces (Figure 1).

The MC-10, which may come to be called the MiCoCo (or possibly the MicroCo) (*Not if we can help it! —Ed.*), doesn't replace the Color Computer, but supplements it. Priced at $119.95, the MC-10 is designed to compete with low-cost computers such as the Timex/Sinclair, and is "aimed primarily at first-time computer buyers," as the press release puts it. See the review elsewhere in this issue.

Seven PC-1 Packages

Radio Shack sent me seven cassette program packages for the PC-1 Pocket Computer. Four are useful (*Statistical Analysis*, *Engineering Math II, III*, and *IV*); one might help you make a few dollars at the track (*Horse Race Analyst*); one might be useful on the links (*Golf Scoring*); and one has rather limited applications (*Calendar*).

All seven packages include imprinted plastic keyboard overlays, and all the programs use prompts to simplify and speed up operations.

Calendar

For $19.95 you get four *Calendar* programs "to solve date-related problems." An overlay, which fits over the bottom left half of the keyboard, simplifies two of the programs.

With Cal I, you can enter any date, expressed as MM.DDYYYY, from 1900 to 2100, and the program first converts it to "Julian date," which here means the number of days from a date back in 4000 B.C. This is then easily converted by Cal I into the day of the year (February 23, 1982 is the 54th day of the year), how many days remain in the year (311), and which day of the week it is (Tuesday).

You can also enter a Julian date or day of the year and make any conversion you choose. Cal I also converts from Gregorian years to Chinese years, and vice versa, with the help of a chart. If you have the chart, however, you don't

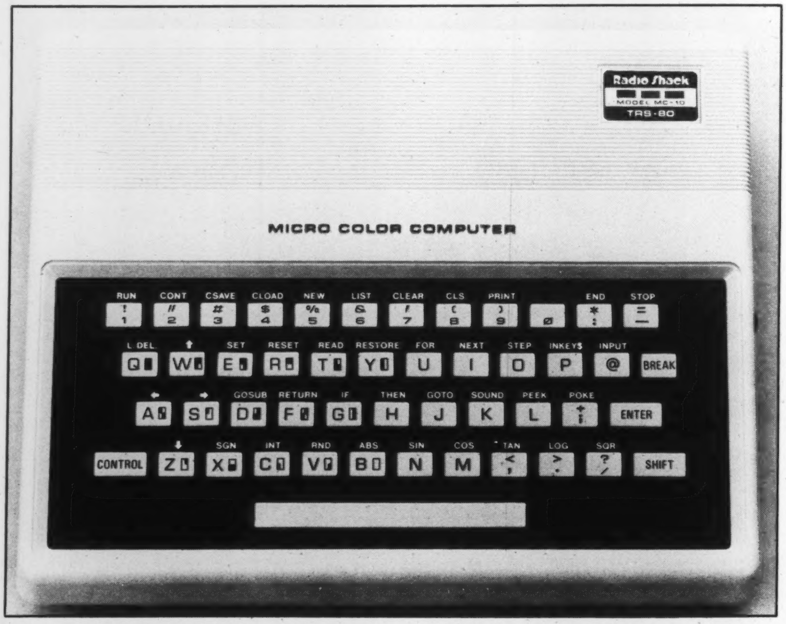


Figure 1. The TRS-80 Micro Color Computer MC-10 has most of the features of the larger Color Computer at a sixth the size and less than half the price.

really need the conversion program. Most inscrutable.

Cal II relates to holidays. It tells you on which day Easter fell in 1982 (April 11) and lists the dates of 17 holidays for any given year, including President's Day.

Cal III relates dates to days of the week. It finds the number of days from one given date to another, the number of times a given day of the week occurs between two dates, the years in which a given date falls on a given weekday, and performs three more similar calculations.

Cal IV provides the dates of the new and full moon for a given month.

Although most of us have little or no use for such date programs, they could be of help in some financial and legal instances, for interest, contracts, and so forth.

Golf Scoring

The full name of this $14.95 package is *Golf Scoring & Handicapping*; it consists of four programs and an overlay.

Play "keeps track of your party's score and pars for each hole while you are actually on the course," the manual says. It keeps score for up to four players over as many as 18 holes. You can review scores for any hole, make corrections, and save data for an entire game on tape.

Score uses the data saved on tape from Play to print a complete scorecard for each game.

Stroke uses data from Play to figure the USGA stroke-controlled score for any player and game.

HDICAP figures your official USGA handicap, using data on your past performance stored on tape.

So you take your PC-1 to the clubhouse, plug in the printer/cassette interface and a tape-cassette recorder, and load Play (you could even do this earlier, at home). Enter the players' names and handicaps, then take the PC-1 around the course as you play, entering hole numbers and scores.

Back at the clubhouse, or later at home, you save the game data on tape. Or if you have everything with you, you can use Score to print out a scorecard right in the clubhouse to show the gang at the bar what a great game you played.

Horse Race Analyst

The subtitle of this $19.95 package is "Using the 5/10 System," which isn't explained in the manual. The overlay uses all 19 of the keys over which it fits, all 26 alphabetic keys are required for entering variables.

The Daily Racing Form past-performance data for each horse (distance, time, track condition, finish position, and so on) are entered, after which the PC-1 displays a computed score. The horse with the highest Horse Score in a race is the predicted winner, according to the manual. It adds, "We can't guarantee that this system will enable you to choose a winner. As with all systems, none are perfect." If it were, of course, the programmer would be at the track, rather than writing 5/10.

The manual provides information on how to improve predictions: one suggestion is to "eliminate horses whose finish positions in the last two races total more than 16 lengths behind."

Engineering Math II

This package, which contains three programs and two overlays, is $14.95.

Vector performs all common vector operations in 3D, in both Cartesian and polar coordinates. Chain operations are allowed, and the mode may be changed between polar and rectangular at any point during program execution.

Complex performs all common operations on complex numbers, including sines, cosines, arc sines, and arc cosines. Chain operations are allowed.

ADVMATH provides 24 common trig functions in degrees or radians, including arc hyperbolic cosecant. It also provides logs to any base and an exponentiation function that raises negative numbers to positive or integral negative powers.

Engineering Math III

This $10.95 package contains two programs and one overlay.

SIMEQ solves systems of up to nine linear equations for all unknowns. It can also complete a Gaussian reduction of matrices from 2-by-2 to 9-by-9.

PCALC solves common polynomial functions and calculus solutions for polynomials to the ninth order. It also evaluates the polynomial at any point, calculates an exact derivative at any point, calculates an exact integral between any two points, and searches for Newtonian roots.

Engineering Math IV

For $7.95 you get one program and an overlay. TRIANG provides solutions for the three common triangles and can also solve from three Cartesian coordinates. TRIANG provides for angles in degrees, radians or grads, calculates areas, and tests for equilateral, right, isosceles, obtuse, and scalene properties.

Statistical Analysis

A data-analysis package of six programs and three double-sided overlays costs a modest $24.95.

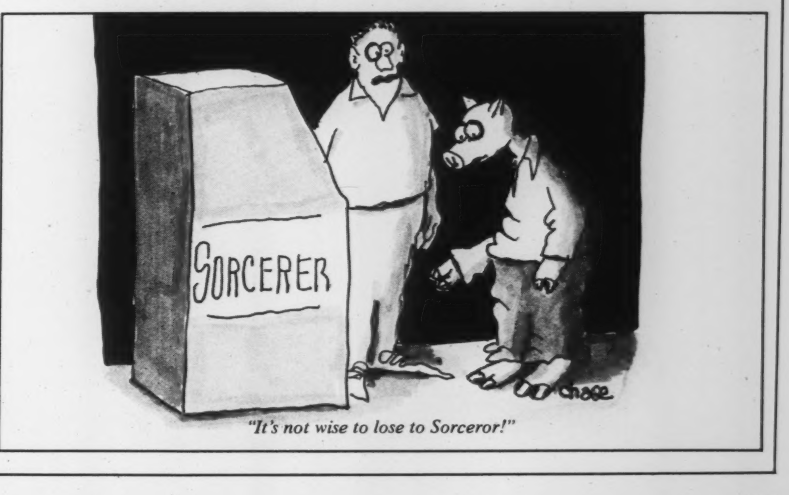
The six programs are Descriptive Statistics, Correlation and Regression, Analysis of Variants, Chi Square Analysis, Distributions (normal, t, F, X^2), and Multiple Regression.

Descriptive Statistics provides an overall picture of the data set, which can contain up to 130 values. Output from this program includes sample statistics (sample size, mean, sum, sum of squares, variance, and standard deviation) and unbiased estimates of population parameters (variance, standard deviation, and standard error of the mean).

Clean Slate

The two previous columns described the *Master Directory II* and *Superkeys* programs from Howard W. Sams & Co. Let's make it a trio with a look at *Clean Slate.*

Described by Sams as "more than a word processor," *Clean Slate* requires a Model I/III/4 with 32K of RAM, one disk drive, and a parallel or serial printer.



"It's not wise to lose to Sorceror!"

TRS-80 Strings, continued...

Before using *Clean Slate,* you enter configuration data such as which DOS you are using, whether your printer executes a backspace (most dot-matrix printers will not), and communications parameters such as the length of response delay (if you have the RS-232 interface). You do all this only once.

Then you enter a document name and the number of the disk drive that contains the old text or where you want to save the new one.

A few of the *Clean Slate* commands are like those of *Scripsit:* D for delete, I for insert, P for print. However, it is page-oriented, so the up and down arrows will move to the previous or next page on the display. There are many more editing commands, some of which may be unique, such as CLEAR/E to split a line in two at the cursor, CLEAR/C to center the current line, and so forth.

Clean Slate has many word processing functions not found in *Scripsit,* such as Ruler Mode (displays a ruler with a scale taken from the printer pitch value you entered), Justify Line (adds spaces to expand a single line to the right margin position), Vertical Tab Set, Word Count, and several dozen more.

Forms can be constructed by building a minimal portion with hyphens (for the horizontal lines) and exclamation marks (for the verticals), then duplicating it to assemble a much larger blank form.

The printing capability includes underlining, boldface, backspacing, page numbers, printing some pages but not others, headers and footers, and many others.

Using the APPEND function, you can load Basic programs, assembler source files, Fortran, and other compiler source codes into a *Clean Slate* document. Personalized form letters can be created by using APPEND to merge the form letter with a list of names and addresses.

One of the most powerful commands in *Clean Slate* is the Glossary function, which permits you to store any sequence of keystrokes under an ID name, and then call it up anytime you need the phrase in the text. Sequences of commands can also be stored using Glossary, so you can, for example, right justify a whole page with Justify, instead of a single line.

Like a little more? The Parameter Change function lets you change any or all of 20 parameters and system limits, such as cursor blink rate, printer pitch, linefeed count, printer status mask, and so forth. The cursor moves rather slowly, but that too can be changed from its preset value by simply varying the Repeat Rate, to the point that the cursor zips across the screen so fast you may want to slow it down.

If this isn't enough for you, *Clean Slate* also has a Terminal Communications Mode, with all the capabilities of full and half duplex, batch send, parity check, and so on.

Clean Slate works with TRSDOS, NEWDOS, VTOS, LDOS, DOS PLUS, TDOS, and several others but not Microdos.

Although the manual isn't written for beginners in computers or word processing, its 109 pages are crammed with detail. Before doing much hands-on stuff it is best to read the entire manual to get an overall picture of the large variety of features available.

Clean Slate doesn't have the tutorial audio tapes that come with *Scripsit* and *SuperScripsit,* but it is only $79.95. It is highly recommended for a sophisticated word processing package that has a raft of extras.

Med Systems Becomes ScreenPlay

One of the more ingenious software houses, Med Systems Software, changed its name to ScreenPlay this spring and dropped all but one of its utilities, educa-

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tional programs, and other such software, to concentrate on games.

Most of the games are for the Model I/III/4 TRS-80; several are for the TRS-80 Color Computer and for the Apple, Atari, and IBM PC. The TRS-80 Model I/III/4 games include 3D adventures (with perspective) such as *Asylum*, 2D adventures such as *Warriors Of Ras*, and several Jyym Pearson epics (*The Institute*, *Lucifer's Realm*, and so forth), and arcade games such as *Laser Defense*. Color Computer games include *Invader's Revenge*, *Phantom Slayer*, and *Monkey Kong*. Write for the latest catalog, which includes T-shirts imprinted with logos from some of the games.

Gone are the excellent *GRBasic*, a graphics utility that adds a set of commands to Basic that lets you produce graphics with machine language speed directly from Basic, and the clever *Better Text*, which generates two sizes of large characters, permits you to create your own characters, and provides 15 commands for creating outstanding display screens with a minimum of programming effort.

ScreenPlay's QWERTY

The only non-game program still available from ScreenPlay is the *QWERTY 3.0* word-processing program, which is an extensive patch for *Scripsit*. First you copy *QWERTY 3.0* onto a TRSDOS or NEWDOS disk that already contains *Scripsit*; this requires two disk drives. Two versions of the program are supplied, for 32K and 48K machines.

QWERTY 3.0 is "aimed at using the proportional style of print as the main style of its texts, and is aimed at the production of technical reports," according to the manual. The program automatically prints proportionally, adds 75 new symbols (including upper- and lowercase Greek letters, math symbols, and so forth), adds subscripts or superscripts to any character, underlines, prints boldface, adds decorative borders to text, prints in two or three columns per page, indicates where pages will end without printing the text, and provides other conveniences not found even in Radio Shack's *SuperScripsit* (July 1983, p. 290).

The 75 new symbols are created by using combinations of backspacing, various linefeeds, and condensed and expanded styles of print. For example, an infinity sign is created by printing two lowercase letter o's close together. A lowercase Greek mu is made up of a lowercase u and a doubly overprinted exclamation mark.

The manual provides a great deal of information, but is difficult to use for reference. Although there is an index, the chapters aren't divided into sections, so you often have to scan a whole page to find what you want. This is a small point, however, in a most ingenious patch to *Scripsit* that has WP uses far beyond the proportional printing of technical reports.

Listing 1.

```
100 CLS
110 P$(0)="FIRST": P$(1)="SECOND"
120 PRINT P$(F);
130 INPUT" MM, DD,YYYY";M,D,Y
140 Z=D+INT(30.6001*(M+1-12*(M<3)))
    +INT(365.25*(Y-1900+(M<3)))
150 PRINT MID$("SUNMONTUEWEDTHUFRISAT",
    1+3*(Z-7*INT(Z/7)),3)
160 IF F=0 THEN X=Z: F=1: GOTO 110 ELSE
    PRINT "DAYS BETWEEN DATES = "ABS(Z-X)
```

QWERTY 3.0 is $74.95 for the Lineprinter IV and the Centronics 737 or 739. The *Daisy* version, for the Radio Shack Daisy Wheel II printer, is the same price and adds more than 100 new symbols. For cautious buyers, the 73-page *QWERTY 3.0* manual or the 110-page *Daisy* manual is $10, which is credited toward the purchase price of the software.

Short Program #43: Day of Week

From Charleston, SC, Leonard Zucker writes:

"I couldn't let go unchallenged Max Seim's claim (January 1983, p. 337) to the shortest Basic program to compute day-of-week. Here is a one-liner that tells you not only the day of the week of two given dates, but also the number of days between the dates. Furthermore, the program is accurate for dates from March 1, 1900 to February 28, 2100. The algorithm used is based on a program for the Hewlett-Packard 97 calculator included with its applications pack.

"I use this algorithm, which computes the number of days (Z) since February 28, 1900, in all my programs requiring calendar calculations. An inverse function allows me to recover month, day, and year for a given value of Z."

The one-liner, rewritten to make it easier to read, appears in Listing 1.

As a check, the number of days between March 1, 1900 and February 28, 2100 is 73048. Leonard also included a short program to demonstrate the use of his one-liner; mainly, it adds PRINT lines to make the RUN more easily understood.

The program computes the number of days after February 28, 1900, for each of the two dates, and then subtracts one from the other. For example, if you input 1,1,1983 and 1,1,1984, Z is computed as 30744 and X as 30379. The difference is 365.

Can you figure out the details of how Leonard's "one-liner" works? The 365.25 in line 140 is, of course, the number of days in each year of a four-year cycle. But what relationship does 30.6001 have to the number of days in a month? And if the actual number of days between 3,1,1900 and 1,1,1983 is 30256, why does the program come up with 30379 or 123 more days than the actual count?

Note: The program considers 1900, 2000, and 2100 as leap years, although only 2000 is; this is the reason for the accuracy limits. ☐

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Stephen Gray, et al.

Fundamentals of Interactive Computer Graphics, by James D. Foley and Andries Van Dam. Addison-Wesley Publishing Co., Reading, MA. 680 pages, hardcover $34.95. 1982.

The latest in the publisher's Systems Programming Series (sponsored by IBM Corp.), this handsome book, designed to provide both a tutorial and a reference source, "presents graphics concepts and recent advances in graphics hardware and software," according to the jacket, which adds, "The authors develop a complete graphics application program in Pascal, using the new Core System of standard graphics subroutines proposed by ACM's Siggraph."

The 17 chapters are presented in a shell sequence. Shell One covers the basics; Shell Two, mathematics, data structures and display architecture; Shell Three, modern raster technology; and Shell Four, making realistic synthetic photographs. An extensive, 29-page bibliography is included.

Although no previous background in graphics is needed, the authors assume "A basic background in programming and data structures, and some familiarity with computer architecture." They also assume a knowledge of matrices and differential calculus.

Although slightly stuffy, the writing is authoritative, detailed, and clarified by many drawings and photographs, including a section of 28 color plates. This is one of the best computer graphics texts available, either for classroom use or for individual reading.

Computers for Sea & Sky, by Stephen J. Rogowski. Creative Computing Press, Morristown, NJ. 112 pages, paperback $9.95. 1982.

The subtitle of this 8-1/2-inch-by-11-inch collection of 47 programs in Basic is, "A compendium of computer programs and algorithms for use in navigation, aviation, astronomy, surveying, meteorology, sailing and a myriad of other disciplines." The back cover adds "You can perform the calculations scientists use to predict the time of sunrise, the date for Easter, or the distance between any two points on earth."

The seven chapters provide programs for Aviation (Propeller Tip Speed, Rate of Climb, etc.), Charts (Meridional Parts, Chart Scaling, etc.), Mathematics (Plane Oblique Triangles, Haversine Computation, Ageton Navigation Method, etc.), Meteorology (Temperature Conversion, Barometric Correction, etc.), Navigation (Dead Reckoning, Great Circle Computations, etc.), Speed/Distance (Line-of-Sight Distance, Speed Computation, etc.), and Time and the Sky (Easter Date, Day of the Year, etc.). The book ends with a glossary, bibliography, and an appendix of constants.

Each program is accompanied by a full discussion of the topic (with relevant formulas), a listing, examples with runs, and usually a drawing or two. The book is handsomely typeset by software developed at SUNY by the author, who is a teacher and also a licensed pilot.

The author has "avoided string variables and even subscripted arrays wherever practical. It should be possible to run most of the programs on all micros and even some of the pocket computers which have emerged using Basic."

Although not for everybody, this very well written and produced book is the first of its kind, and should be of interest to pilots and navigators (for whom it can replace a great many tables), and anybody else with an interest in the subject.

More Subroutine Sandwich, by John P. Grillo and J.D. Robertson. John Wiley & Sons, Inc., New York. 270 pages, paperback $12.95. 1983.

This is the second of two manuals of Extended Basic subroutines useful in reducing the time required to build programs. The 15 chapters are divided into three parts: Suggestions to the Reader (How to Use This Book, How to Use the Subroutines), Subroutines, and Mother Programs.

The eight subroutine chapters cover Date Processing (Julian Date, Reverse Day of the Year, etc.), Word Processing (Buffer Fill, Text Justify, etc.), Cryptography (Phrase Key Code, Rail-Fence Code, etc.), Mathematics (Binary-to-Decimal Conversion, Horner's Method, etc.), Table Management (Insertion Sort, Quicksort, etc.), Statistics (Rank, Permutations, etc.), Table Lookup and Utilities (Interpolation Search, Shuffle, etc.), and Business (Straight-Line Depreciation, Declining-Balance Depreciation, etc.).

Each of the 36 subroutines covers four pages, and includes a description of how it works, source reference, listing, list of variables, notes on modifications and special features, a program that incorporates it, and a run.

Each of the last five chapters contains a mother program that "illustrates the real-life applications of many of the subroutines": Resort Time-Sharing Weeks, Text in Adjacent Columns, File Protection, Chebyshev Polynomial Plotter, and Probability of One Pair in Poker.

The title of the book comes from the authors considering the first and third parts (suggestions and mother programs) to be the slices of bread, and the subroutines to be the filling: the cover shows a juicy hamburger.

There have been many books of "useful" programs; this is one of the very few to provide such programs as building-block subroutines, to be assembled into whatever the reader has in mind. And it is one of the very best, packing many useful ideas into a handy volume. Although "intended primarily for the TRS-80 Basic programmer, it is appropriate for any other programmer as well."

The only catch is that, to have the widest choice of subroutines, you'll have to buy the authors' first book, *Subroutine Sandwich*, also $12.95, with almost exactly the same chapter headings and thus the same types of subroutines among the 36 provided. The five mother programs are Annotated Calendar, Binary Addition Drill and Practice, Tea Selection, Linear Interpolation, and Monthly Sales Data Report.

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Parent's Guide to Computers in Education, by David Moursund, Int'l Council for Computers in Education, 135 Education, Univ. of Oregon, Eugene, OR 97403, 80 pages, $3.50.

The Parent's Guide is an easy introduction to the use of computers for education in the home. Obviously, it does not replace the school of "hard knocks," i.e., real world experience, but it makes the entry much simpler.

This little 80-page book has seven chapters and two appendices. The first six chapters focus on the "School of the Future," an introduction to the use of computers in education, hardware, software, and other general information.

The first chapter is fascinating: it is David Moursund's view of the School of the Future. He leads his readers through a wonderful, imaginary vision of a classroom of the future, and then asks if his scenario seems like science fiction. You are tempted to say "yes," but David shows how everything in the scenario is possible now using the technology of today.

In the section on history, a couple of dates are off by a few years, but the gist is on target, and one is left with the feeling that we have come a long way, Baby, much further than you might think.

Unfortunately, it is not until the seventh chapter that we get to the really meaty information of how to select and buy a small computer. Nevertheless, the earlier information is very useful, and interested parents will want to bone up on this material.

The final (7th) chapter contains a "Buyer's Plan" containing handy charts for assessing your needs and your implementation (fancy way of saying, the hardware and software you intend to buy).

A sidelight, or perhaps we should say the highlight, of the book, is the boxed righthand eighth pages by Merle Marsh titled, "Comes the Dawn." This is a description of the trials and tribulations of a mother of a "Compukid" at the time of the purchase of a first computer for their home.

To our knowledge, there is no other book on the market like this one. If you are an interested parent with a child between 4 and 17, an investment of $3.50 for this book would be well worthwhile. (If your local bookstore doesn't have it, ICCE will send you a copy for just $3.50 postpaid.) *—DHA*

The Wonders of Magic Squares, by Jim Moran. Vintage Books, a division of Random House, New York. 234 pages, paperback $5.95, 1982.

Magic squares are "the mathematical equivalent of the crossword puzzle and two-dimensional cousin of the Rubik's Cube... an absorbing diversion of great antiquity," over 3000 years old, according to the press release accompanying this intriguing book.

The 56 sections of the book are divided into three chapters: Introduction; The Construction of Odd-Order Magic Squares (with 14 methods); the Construction of Even-Order Magic Squares (with nine methods). The other sections cover a range of magic-square subjects, including Disguised Magic Squares, and Benjamin Franklin on Magic Squares, and a few non-magic-square items, such as The Structure of the Binary System (although the book doesn't get into the computer solution of magic squares), and Peculiarities of the Number 37.

Moran, better known as a publicist and practical joker (to publicize a Broadway play, he rode through Manhattan in the back seat of a London taxi with an orangutan in the driver's seat), hadn't even heard of magic squares until five years before writing the book. He learned fast, and has filled these 200-plus pages with enough on the subject to satisfy almost any math addict.

The writing is often unorthodox for such a subject, with a highly personal and original style, but it is infectiously enthusiastic. Moran manages to find connections between magic squares, tic-tac-toe, genetics, atom bombs, and egg foo yung. For $5.95 the book is a bargain for anyone interested in the "beauty and fun" of magic squares.

Microcomputer Disk Techniques, by Paul Swanson. Byte Books/McGraw-Hill, Peterborough, NH. 243 pages, paperback $15. 1982.

This slim but expensive paperback "will help the microcomputer user squeeze every bit of use out of a disk system," according to the back cover, which adds that "the authors show how sophisticated methods used on larger computers may be implemented on a personal computer."

The 23 chapters are divided into two parts; the first consists of three introductory chapters on the disk and disk drive, DOS, and Taking Care of the Disk. The four sections in Part Two have no titles, but might be called Random-Access Files, Three Types of Key Files, Parameter-Driven Subroutines, and The Key-File Program. The five appendixes contain several expected items, along with a listing of the program used to create the glossary, and a 44-page supplement that explains the differences between the Apple and the TRS-80 the book's examples are written with.

This detailed, highly knowledgeable, and apparently unique book is very well written in a clear, simple style. It is recommended to any amateur programmer who really wants to learn how to make the most effective use of a personal computer disk drive.

Assembly Language Graphics for the TRS-80 Color Computer, by Don Inman and Kurt Inman. Reston Publishing Co., a Prentice-Hall Co., Reston, VA. 288 pages, hardcover $19.95; paperback $14.95. 1983.

Once you've thoroughly understood Inman's book, *TRS-80 Color Computer Graphics* (Reston), you might want to see "how an assembler can be used to perform feats that would be quite difficult, if not impossible, in Basic language. Rather than introduce machine and assembly languages through a mathematical approach, we have chosen sound and graphics as the vehicle for learning," the preface says.

After an introduction to machine language, the book looks at Sound, Editing, Color Graphics, Animation, Sound and Graphics, Joystick Animation, Text, Graphics with Text, and Vistas Beyond (mostly on making your own PROMs and machine language tapes). Each chapter ends with a summary and test; answers are provided for the odd numbered test exercises. The authors use and recommend the CBUG machine language monitor and SDS80C Software Development System from The Micro Works (Del Mar, CA).

Rather than merely presenting assembly language programs to be keyed in and run, the authors explain the meaning of all the instructions, with many examples, in a very clearly written text intended for hands-on use.

Assembler is not an easy language for most Color Computer users who know only Basic, but this text is one of the very best (and very few) to explain it as simply as possible.

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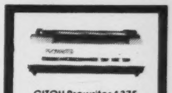
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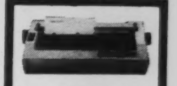
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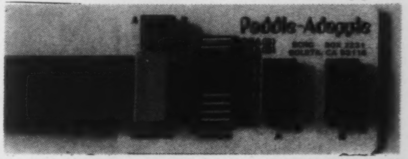

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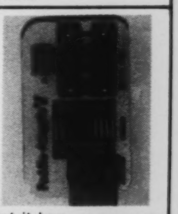

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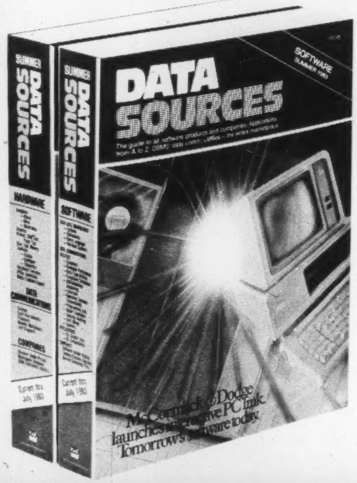

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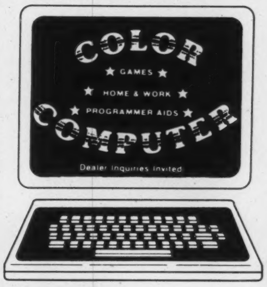

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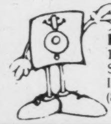

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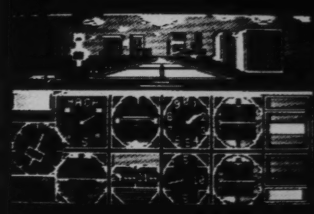

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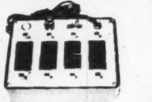

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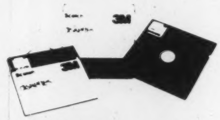

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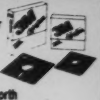

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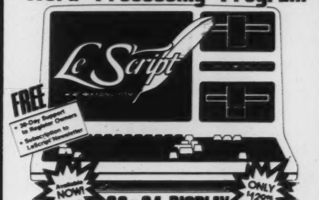
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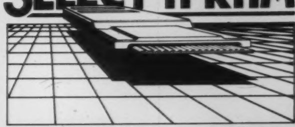

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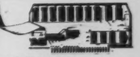

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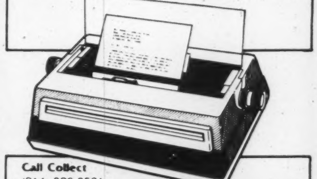

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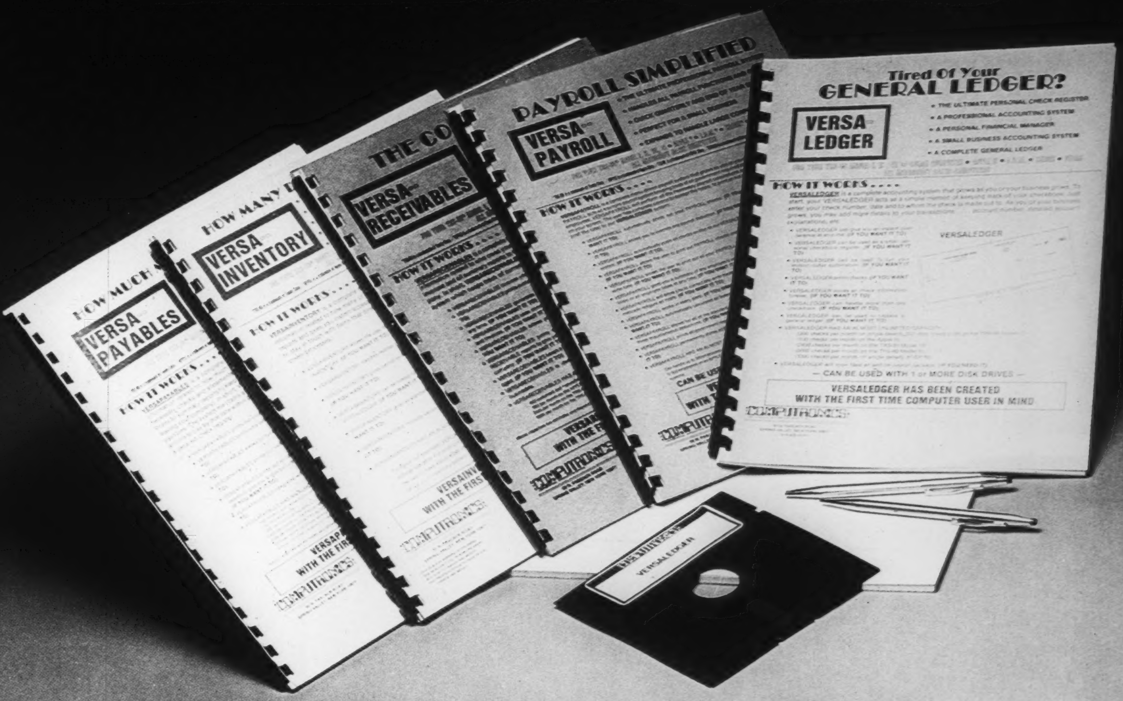

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